UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
WILDLIFE SERVICES

ENVIRONMENTAL ASSESSMENT

for the

Wildlife Damage Management at Airports in Indiana
Prepared by:

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
WILDLIFE SERVICES

1158 Smith Hall
Purdue University
West Lafayette, IN 47907-1158

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1.1 Introduction

The United States Department of Agriculture (USDA) is authorized and directed by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for the Wildlife Services (WS) program is the Act of March 2, 1931, as amended (7 U.S. C. 426-426c; 46 Stat. 1468) and the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 (P.L. 100-202). WS activities are conducted in cooperation with other federal, state and local agencies; and private organizations and individuals. Federal agencies, including the United States Department of Interior, Fish and Wildlife Service, recognize the expertise of WS to address wildlife damage issues related to migratory birds.

Wildlife damage management, or control, is defined as the alleviation of damage or other problems caused by or related to the presence of wildlife. It is an integral component of wildlife management (Leopold 1933, the Wildlife Society 1990, Berryman 1991). The WS program uses an Integrated Wildlife Damage Management (IWDM) approach (sometimes referred to as Integrated Pest Management or IPM) in which a combination of methods may be used or recommended to reduce wildlife damage. IWDM is described in Chapter 1, 1-7 of The Animal Damage Control Program Final Environmental Impact Statement (USDA 1997). These methods include the alteration of cultural practices as well as habitat and behavioral modification to prevent damage. The control of wildlife damage may also require that the offending animal(s) be removed or that populations of the offending species are reduced through lethal methods.

WS's mission is to "provide leadership in wildlife damage management in the protection of America's agricultural, industrial and natural resources, and to safeguard public health and safety." This is accomplished through:

A) Training of wildlife damage management professionals;
B) Development and improvement of strategies to reduce economic losses and threats to humans from wildlife;
C) Collection, evaluation, and dissemination of management information;
D) Cooperative wildlife damage management programs;
E) Informing and educating the public on how to reduce wildlife damage and;
F) Providing data and a source for limited-use management materials and equipment, including pesticides (USDA 1989).

This Environmental Assessment (EA) evaluates ways by which this responsibility can be carried out to resolve conflicts with wildlife at airports in Indiana.

WS is a cooperatively funded and service oriented program. Before any operational wildlife damage management is conducted, WS and the land owner/administrator must complete Agreements for Control or WS Work Plans. WS cooperates with private property owners and managers and with appropriate land and wildlife management agencies, as requested, with the goal of effectively and efficiently resolving wildlife damage problems in compliance with all applicable federal, state, and local laws.

Individual actions on the types of sites encompassed by this analysis are categorically excluded under the APHIS Implementing Regulations for compliance with the National Environmental Policy Act (NEPA) (7 CFR 372.5(c)). APHIS Implementing Regulations also provide that all technical assistance furnished by WS is categorically excluded (7 CFR 372.5(c)) (60 Federal Register 6,000, 6,003 (1995)). WS has decided to prepare this EA to assist in planning wildlife damage management (WDM) activities and to clearly communicate with the public the analysis of cumulative impacts for a number of issues of concern in relation to alternative means of meeting needs for such management at airports in Indiana. This analysis covers WS's plans for current and future WDM actions wherever they might be requested on airports.

This environmental assessment (EA) documents the analysis of the potential environmental effects of the proposed program. This analysis relies mainly on existing data contained in published documents, primarily the Animal

Damage Control Final Environmental Impact Statement (USDA 1997) to which this EA is tiered. These WS activities will be undertaken in compliance with relevant laws, regulations, policies, orders, and procedures including the Endangered Species Act.

A Notice of Availability of the draft environmental assessment (pre-decisional) was published consistent with APHIS NEPA procedures to allow interested parties the opportunity to obtain and review the document and comment on the proposed management activities.

1.2 Purpose

The purpose of this EA is to analyze the effects of WS activities on civil and military airports in Indiana to manage damage caused by the mammal and avian wildlife species. Experts within the Federal Aviation Administration (FAA) and the U.S. Department of Agriculture expect the risk, frequency, and potential severity of wildlife-aircraft collisions to escalate over the next decade (Cleary et al. 2001). Mammals may include, but are not necessarily limited to the following. White-tailed deer (*Odocoileus virginianus*), Coyotes (*Canis latrans*), *Raccoons (Procyon lotor*), Opossums (*Didelphis virginianus*), Red Fox (*Vulpes fulva*), Gray Fox (*Urocyon cinereoargenteus*), Feral cats (*Felix sp*.), Striped Skunk (*Mephitis mephitis*), Beaver (*Castor* canadensis), and Muskrat (*Ondatra zibethica*).

Avian bird species may include, but are not necessarily limited to the following. Red winged black birds (*Agelaius phoeniceus)*, European starlings *(Sturnus vugaris*), Brown headed cowbirds (*Molothrus ater*), Easterm Meadow Larks (*Sturnella magna)*, Horned larks (*Eremophila alpestris)*, Killdeer (*Charadrius vociferus)*, Canada Geese (*Branta canadensis)*, Snow Geese (*Chen caerulescens)*, Mallards (*Anas platyrhynchos*), Other Ducks (Anatinae), Terns (Sterninae), Gulls (Larinae), Short-eared Owl (*Asio flammeus*), Great Horned Owl (*Bubo virginianus*), Barred Owl (*Strix varia*), Red-tailed Hawk (*Buteo jamaicensis*), Rough-Legged Hawk (*Bueto lagopus*), American Kestrel (*Falco sparverius*) , Swansion's Hawk (*Buteo swainsoni*) , Northern Harrier (*Circus cyaneus*), Wild Turkey (Meleagris gallopavo), Mourning dove (*Zenaida macroura*), Rock dove (*Columba livia),* Purple finch (*Carpodacous purpureus*), House finch (*Carpodacous mexicanus*) Barn swallow (*Hirundo rustica*), Cliff swallow (*Petrochelidon pyrrhonota*), American crow (*Corvus brachyrhnchos*), Turkey vultures (*Cathartes aura*) Common grackles (*Quiscalus quiscula*), Blue Jay (*Cyabicutta crustata*), Eastern bluebird (*Sialia sialis*), Northern Cardinal (*Cardinalis cardinalis*), Upland sandpiper *(Bartramia longicaude*), and Common snipe (*Capella gallinago*).

Resources protected by such activities include property, and human health and safety.

1.3 Need For Action

1.3.1 Summary of Proposed Action

The proposed action is to continue the current WS program at civil and military airports in Indiana that respond to requests for WS WDM to protect, property, and human health and safety at airports. An Integrated Wildlife Damage Management (IWDM) approach would be implemented which would allow use of any legal technique or method, used singly or in combination, to meet request or needs for resolving conflicts with wildlife affecting the use of the airfield and safe airport operations (Appendix B). Airport personnel requesting assistance would be provided with information regarding the use of effective non-lethal and lethal techniques. Lethal methods used by WS would include shooting, trapping, toxicants, or euthanasia following live capture by immobilization drugs or trapping. Non-lethal methods used by WS may include habitat alteration, chemical immobilization, repellents, fencing, barriers and deterrents, netting, capture and relocation, and harassment or scaring devices. In many situations, the implementation of non-lethal methods such as habitat alteration, structural modifications, and exclusion-type barriers would be the responsibility of the airport to implement. WDM by WS would be allowed on the airports and adjacent properties, when requested, where a need has been documented and upon completion of an Agreement for Control. All management actions would comply with appropriate

federal, state, and local laws.

1.3.2 Objective for the Wildlife Services WDM Program at Airports in Indiana

The purpose of the proposed action is to minimize the threat to human health and safety and damage to property.

Specific objectives:

* To reduce damaging wildlife strikes to less than 5 strikes per year per airport
* Reduce and maintain wildlife use in hangers to less than $1000 in damage per year per airport.
* To maintain the runways and airfields to no down time caused by wildlife

1.3.3 Need for Wildlife Damage Management to Protect Property

Virtually all airports in the state of Indiana contain similar types of habitat such as woodlands, wetlands, grasslands, croplands, and suburban areas. Thus, airports in Indiana may deal with similar types of hazards caused by wildlife. Wildlife creates a variety of problems at airports that can compromise safe aircraft operations. The most significant are the thousands of collisions that occur annually between wildlife and aircraft (Cleary and Dolbeer 1999). The risk that wildlife pose to aircraft is well documented with the worst case reported in Boston in 1960 when 62 people were killed in the crash of an airliner which collided with a flock of starlings (Terres 1980). Wildlife strikes result in millions of dollars in direct and indirect damages. Fortunately in Indiana, wildlife strikes have not yet resulted in catastrophic accidents involving the loss of human life, but the potential is real; such accidents have occurred in the past and are occurring with increasing frequency nationwide (Cleary and Dolbeer 1999). Wildlife has adverse impacts on property at airports, such as rodent damage to runway light cables and other electronic safety equipment, bird nests on aircraft and in aircraft engines. The large accumulations of bird droppings associated with nests and roosts causes damage to landscaping, structures, aircraft, vehicles and equipment, and harbor transmissible zoonotic diseases.

Since 1990, 28 Indiana Civil airports recorded more that 300 wildlife strikes; of these 164 had identifiable remains (USDA 1998). These Indiana airports experienced strikes from gulls (5.5%), white-tailed deer *Odocoilous virginiaous* (1.4%), other mammals (.27%), raptors (5.7%) waterfowl (5.5%) and other birds (22.4%) that include blackbirds, starlings, pigeons, killdeer and doves. This number is likely to be much greater since an estimated 80% of civil bird strikes go unreported (Bird Strike Committee USA 2000).

1.3.3.1 Need for Bird Damage Management to Protect Property

Birds are a continuous threat to aircraft for the simple fact that they are highly mobile and often prefer the habitat created by an airfield. With this in mind and following the basic laws of physics that no two items can occupy the same space at the same time, a pro-active management should be taken in order to reduce these threats. A prime example where pro-active management would have saved lives was in September 1995, an USAF AWAC aircraft crashed immediately after take-off at Elmendorf Air Force Base, Alaska, killing all 24 personnel on board (USDA 1998). The plane struck a flock of Canada geese that had been seen on a field adjacent to the airfield by a controller, unfortunately the E-3 crew or the Airfield management was not notified. This is not an isolated incident, in September 1997 a Northwest DC-9 was taking off from an Indiana airport and flew into a flock of European starlings. The plane struck 87 birds and was forced to return immediately. Fortunately, no one was injured, but damages and down time amounted to approximately $60,000 (Cleary and Dolbeer 1999).

Birds occasionally damage structures on private property or public facilities with fecal contamination. Accumulated bird droppings can reduce the functional life of some building roofs by 50% (Weber 1979). Corrosion damage to metal structures and painted finishes, including those

on aircraft and automobiles parked at terminals, can occur because of uric acid from bird droppings. Pigeons, starlings and house sparrows sometimes cause structural damage to the inside of hangers and buildings. These birds often roost or nest in the rafters of the buildings where they damage the insulation, and wiring. Also, birds build their nest in engines and other compartments of parked aircraft.

1.3.3.2 Need for Mammal Damage Management to Protect Property

Mammals also pose a serious threat to aircraft. Deer, coyotes, skunks and raccoons venture onto airfields and become a direct threat to planes both landing and taking off. Since 1985 the USAF has recorded more that 190 strikes that involved aircraft and mammals (Cleary and Dolbeer 1999). These strikes resulted in more than $496,000 in damage. Of these strikes, deer are the most costly to aircraft, with the most recent occurring at Laughlin AFB in March of 2000. A T-38 Talon hit a deer on landing and caused damage to the left main landing gear (BASH 2000). Also at Little Rock AFB, between 1993 and 1998 three deer strikes were recorded (BASH 2000). These strikes averaged over $4600 per strike. An Indiana airport also experienced a similar mammal strike. In January 2000 a Falcon 900 B struck a coyote during take off. Damage was done to the landing gear of the aircraft, which put the plane out of service for more than 24 hours and cost $29,600 in damage (Personal communication, Keith Berlen,10/12/00, Bird Strike Report). WS has been working at Indiana airports to reduce threats through technical assistance and direct control. Such activities include the recommendation to modify habitat and use of harassment techniques.

1.3.4 Need for Wildlife Damage Management to Protect Human Health and Safety

Wildlife poses risks to human health and safety when their populations reach relatively high numbers or when concentrated in a localized area. These risks include but are not limited to items such as transmission of diseases, injury or death to persons involved in wildlife/aircraft strikes and injury from aggressive behavior of wildlife.

1.3.4.1 Mammal Damage Management to Protect Human Health and Safety

WS is often contacted and asked to solve problems involving mammal damage issues in relation to human safety. At many airports there is the continuing risk of a mammal/aircraft strike which could result in human injury or death (Cleary and Dolbeer 1999). WS has been requested to resolve problems such as the removal of mammals from under buildings, in common areas where people work or congregate, and from the airfield. Examples include the removal of skunks from hangers and around buildings; deer that have wandered onto the airfield; and coyotes that have crossed runways and taxiways while foraging for rodents. Another issue of concern that WS has been asked to address is wild mammal's carrying/transmitting rabies or other zoonotic diseases.

1.3.4.2 Bird Damage Management to Protect Human Health and Safety

Bird/aircraft strikes occur when birds occupy the same space as aircraft. The risk of injury is great in these incidents and the loss of life has happened many times (Cleary and Dolbeer 1999). At IN airports, these threats come in many shapes and sizes. Resident Canada geese often use the grass fields for loafing, feeding and nesting areas. Many airports have had problems with blackbirds (red-winged blackbirds, European starlings, grackles, etc.) that have established roosts on or near the airfield. Some roosts have been estimated to exceed 250,000 birds. These large flocks of birds pose such a risk to aircraft and the health and safety of pilots that flight hours have been restricted during peak bird activity. In addition to the threats to aircraft safety, IN airports have requested assistance with the management of feral domestic pigeon, nuisance blackbird or starling roosts. The problems associated with these roosts create disease risks, plus the mess associated with droppings left by concentrations of birds is aesthetically displeasing and results in continual clean-up costs.

Feral domestic pigeons and starlings have been suspected in the transmission of 29 different diseases to humans, (Rid-A-Bird 1978, Weber 1979, and Davis et.al. 1971). These include viral diseases such as meningitis and seven different forms of encephalitis; bacterial diseases such as erysipeloid, salmonellosis, paratyphoid, pasteurellosis, and listeriosis; mycotic (fungal) diseases such as aspergillosis, blastomycosis, candidiasis, cryptococcosis, histoplasmosis, and sarcosporidiosis; protozoal diseases such as American trypansomiasis and toxoplasmosis; and rickettsial/chlamydial diseases such as chlamydiosis and Q fever. As many as 65 different diseases transmittable to humans or domestic animals have been associated with pigeons, starlings, and English sparrows (Weber 1979). Table 1-1 shows the more typical diseases affecting humans that can be transmitted by pigeons and starlings.

Table 1-1. Information on some diseases transmittable to humans and livestock that are associated with feral domestic pigeons, starlings, and English sparrows--Information taken from Weber (1979)

Disease	Human Symptoms	Potential for Human Fatality	Effects on Domestic Animals
Bacterial:			
Erysipeloid	Skin eruption with pain, itching; headaches, chills, joint pain, prostration, fever, vomiting	Sometimes-particularly in young children, old or infirm people	Serious hazard for the swine industry
Salmonellosis	Gastroenteritis, septicaemia, persistent infection	Possible, especially in individuals weakened by other disease or old age	Causes abortions in mature cattle, possible mortality in calves, decrease in milk production in dairy cattle
Pasteurellosis	Respiratory infection, nasal discharge, conjunctivitis, bronchitis, pneumonia, appendicitis, urinary bladder inflammation, abscessed wound infections	Rarely	May fatally affect chickens, turkeys, and other fowl
Listeriosis	Conjunctivitis, skin infections, meningitis in newborns, abortions, premature delivery, stillbirth	Sometimes-particularly with newborns	In cattle, sheep, and goats, difficulty swallowing, nasal discharge, paralysis of throat and facial muscles
Viral:			
Meningitis	Inflammation of membranes, covering the brain, dizziness, and nervous movements	Possible-can also result as a secondary infection with listeriosis, salmonellosis, cryptococcosis	Causes middle ear infection in swine, dogs, and cats
Encephalitis (7 forms)	Headache, fever, stiff neck, vomiting, nausea, drowsiness, disorientation	Mortality rate for eastern equine encephalomyelitis may be around 60%	May cause mental retardation, convulsions, and paralysis
Mycotic (fungal):			

Aspergillosis	Affects lungs and broken skin, toxins poison blood, nerves, and body cells	Not usually	Causes abortions in cattle
Blastomycosis	Weight loss, fever, cough, bloody sputum and chest pains	Rarely	Affects horses, dogs, and cats
Candidiasis	Infection of skin, fingernails, mouth, respiratory system, intestines, and urogenital tract	Rarely	Causes mastitis, diarrhea, vaginal discharge and aborted fetuses in cattle
Cryptococcosis	Lung infection, cough, chest pain, weight loss, fever or dizziness, also causes meningitis	Possible especially with meningitis	Chronic mastitis in cattle, decreased milk flow, and appetite loss
Histoplasmosis	Pulmonary or respiratory disease; may affect vision	Possible, especially in infants and young children or if disease disseminates to the blood and bone marrow	Actively grows and multiplies in soil and remains active long after birds have departed
Protozoal:			
American trypanosomiasis	Infection of mucous membranes of eyes or nose, swelling	Possible death in 2-4 weeks	Caused by the conenose bug found in pigeons
Toxoplasmosis	Inflammation of the retina, headaches, fever, drowsiness, pneumonia, strabismus, blindness, hydrocephalus, epilepsy, and deafness	Possible	May cause abortion or still birth in humans, mental retardation
Rickettsial/Chlamydial:			
Chlamydiosis	Pneumonia, flu-like respiratory infection, high fever, chills, loss of appetite, cough, severe headaches, generalized aches and pains, vomiting, diarrhea, hepatitis, insomnia, restlessness, low pulse rate	Occasionally, restricted to old, weak or those with concurrent diseases	In cattle, may result in abortion, arthritis, conjunctivitis, and enteritis
Q fever	Sudden pneumonitis, chills, fever, weakness, sever sweating, chest pain, severe headaches, and sore eyes	Possible	May cause abortions in sheep and goats

1.4 Current and Projected Work

A variety of services have been and are currently being provided by WS to reduce wildlife hazards at Indiana airports. These services include technical assistance, wildlife hazard assessments, wildlife hazard management plans, and direct assistance. Direct assistance services currently involve one full time WS wildlife biologist to implement the current wildlife hazard management plan. Other airports have contracted with WS to provide technical assistance on a part time basis. Projected work at Indiana airports include conducting wildlife hazard assessments, developing wildlife hazard management plans, providing technical assistance, and conducting direct control services. Examples of different work that has been conducted are: facilitating required permits, recommendations to modify habitat through vegetation management programs, converting croplands on airfields to a monoculture of turf grass, constructing wildlife fences, landscape and architectural consulting, testing new vegetation and perch barrier strategies, and direct control activities. Direct control activities include but are not limited to harassment, capture and relocation programs, and lethal removal.

1.5 Relationship of the Environmental Assessment to other Environmental Documents

WS has issued a Final Environmental Impact Statement (FEIS) on the national APHIS/WS program (USDA 1997). This EA is tiered to the Final EIS. Pertinent information available in the FEIS has been incorporated by reference into this EA.

1.6 Decision to be Made

Based on the scope of this EA, the decisions to be made are:

- Should the IWDM strategy implemented by the WS program be continued at airports in Indiana?
- If not, should WS attempt to implement any of the alternatives to an IWDM strategy as described in the EA?
- Might the implementation of a WS's program of WDM have significant impacts requiring preparation of an EIS?

1.7 Scope Of This Environmental Assessment Analysis

1.7.1 Actions Analyzed This EA evaluates wildlife damage management by WS to protect property, and human health and safety on civil and military airports in Indiana wherever airports request such management from the WS program.

1.7.2 Period for Which this EA is Valid This EA will remain valid until WS determines that new needs for action or new alternatives having different environmental effects must be analyzed. At that time, this analysis and document will be reviewed and revised as necessary. This EA will be reviewed each year to ensure that it is complete and still appropriate to the scope of WS's WDM activities.

1.7.3 Site Specificity. This EA analyzes potential impacts of WS's WDM activities that will occur or could occur on civil and military airports and adjacent properties in Indiana. This EA analyzes the potential impacts of such efforts wherever and whenever they might occur. The EA emphasizes significant issues as they relate to specific areas whenever possible. However, the issues that pertain to the various types of wildlife damage and resulting management are the same, for the most part, wherever they occur, and are treated as such. The standard WS Decision Model (Slate et al. 1992) and WS Directive 2.105 is the routine thought process that is the site-specific procedure for determining methods and strategies to use or recommend for individual actions conducted by WS on airports (See USDA 1997, Chapter 2 and Appendix N for a more complete description of the WS Decision Model and examples of its application). Decisions made using this thought process will be in accordance with any mitigation

measures and standard operating procedures described herein and adopted or established as part of the decision.

1.8 Authority and Compliance

1.8.1 Authority of Federal and State Agencies in Wildlife Damage Management on airports in Indiana

1.8.1.1 WS Legislative Authority

The primary statutory authority for the Wildlife Services program is the Act of 1931, as amended in the Fiscal Year 2001 Agriculture Appropriations Bill, which provides that:

"The Secretary of Agriculture may conduct a program of wildlife services with respect to injurious animal species and take any action the Secretary considers necessary in conducting the program. The Secretary shall administer the program in a manner consistent with all of the wildlife services authorities in effect on the day before the date of the enactment of the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2001."

Since 1931, with the changes in societal values, WS policies and programs place greater emphasis on the part of the Act discussing "bringing (damage) under control," rather than "eradication" and "suppression" of wildlife populations. In 1988, Congress strengthened the legislative mandate of WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

"That hereafter, the Secretary of Agriculture is authorized, except for urban rodent control, to conduct activities and to enter into agreements with States, local jurisdictions, individuals, and public and private agencies, organizations, and institutions in the control of nuisance mammals and birds and those mammal and bird species that are reservoirs for zoonotic diseases, and to deposit any money collected under any such agreement into the appropriation accounts that incur the costs to be available immediately and to remain available until expended for Animal Damage Control activities."

1.8.1.2 U.S. Fish and Wildlife Service (USFWS)

The USFWS is responsible for managing and regulating take of bird species that are listed as migratory under the Migratory Bird Treaty Act and those that are listed as threatened or endangered under the Endangered Species Act. Sections 1.8.2.2 and 1.8.2.3 below describe WS's interactions with the USFWS under these two laws.

1.8.1.3 Indiana Department of Natural Resources Legislative Authority

The Indiana Department of Natural Resources (IDNR), under the direction of the Conservation Commission, is specifically charged by the General Assembly with the management of the state's wildlife resources. The primary statutory authorities include the protection, reproduction, care, management, survival, and regulation of wild animal populations regardless of whether the wild animals are present on public or private property in Indiana (IC 14-22-2-3). The Division of Fish and Wildlife shall administer this article.

1.8.2 Compliance with other Federal Laws

Several other federal laws authorize, regulate, or otherwise affect WS wildlife damage management. WS

complies with these laws, and consults and cooperates with other agencies as appropriate.

1.8.2.1 National Environmental Policy Act (NEPA)

WS prepares analyses of the environmental impacts of program activities to meet procedural requirements of this law. This EA meets the NEPA requirement for the proposed action at airports in Indiana. When WS operational assistance is requested by another federal agency, NEPA compliance is the responsibility of the other federal agency. However, WS may agree to complete NEPA documentation at the request of the other federal agency.

1.8.2.2 Endangered Species Act (ESA)

It is federal policy, under the ESA, that all federal agencies shall seek to conserve threatened and endangered (T&E) species and shall utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts Section 7 consultations with the U.S. Fish & Wildlife Service (USFWS) to use the expertise of the USFWS to ensure that "any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species . . . Each agency shall use the best scientific and commercial data available" (Sec.7(a)(2)). WS obtained a Biological Opinion (B.O.) from USFWS in 1992 describing potential effects on T & E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997, Appendix F).

1.8.2.3 Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-711; 40 Stat. 755), as amended.

The Migratory Bird Treaty Act (MBTA) provides the USFWS regulatory authority to protect families of birds that contain species that migrate outside the United States. The law prohibits any "take" of these species, except as permitted by the USFWS; therefore the USFWS issues permits for reducing bird damage. WS will obtain MBTA permits covering WDM activities that involve the taking of species for which such permits are required in accordance with the MBTA and USFWS regulations, or will operate as a named agent on MBTA permits obtained by cooperators. WS is also authorized by the IDNR covering the intentional take migratory birds for damage management purposes from the IDNR Wildlife Code which regulates take of migratory birds protected by state law.

1.8.2.4 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The Environmental Protection Agency (EPA) is responsible for implementing and enforcing FIFRA. All chemical methods used or recommended by the WS program at airports in Indiana are registered with and regulated by the EPA and Indiana, and are used by WS in compliance with labeling procedures and requirements.

1.8.2.5 National Historic Preservation Act (NHPA) of 1966 as amended

The National Historic Preservation Act (NHPA) of 1966, and its implementing regulations (36 CFR 800), requires federal agencies to: 1) determine whether activities they propose constitute "undertakings" that can result in changes in the character or use of historic properties and, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the State Historic Preservation Office regarding the value and management of specific cultural, archaeological and historic resources, and 3) consult with appropriate American Indian Tribes to determine whether they have concerns for traditional cultural properties in areas of these federal undertakings. WS activities as described under the proposed action do not cause ground disturbances nor do they otherwise have the potential to significantly affect visual, audible, or atmospheric elements of historic properties and are thus not undertakings as defined by the NHPA. WS has determined WDM actions are not undertakings as defined by the NHPA because such

actions do not have the potential to result in changes in the character or use of historic properties.

1.8.2.6 Federal Food, Drug, and Cosmetic Act (21 U.S.C. 360). This law places administration of pharmaceutical drugs, including those used in wildlife capture and handling, under the Food and Drug Administration.

1.8.2.7 Controlled Substances Act of 1970 (21 U.S.C. 821 et seq.). This law requires an individual or agency to have a special registration number from the federal Drug Enforcement Administration (DEA) to possess controlled substances, including those that are used in wildlife capture and handling.

1.8.2.8 Animal Medicinal Drug Use Clarification Act of 1994 (AMDUCA). The AMDUCA and its implementing regulations (21 CFR Part 530) establish several requirements for the use of animal drugs, including those used to capture and handle wildlife in rabies management programs. Those requirements are: (1) a valid "veterinarian-client-patient" relationship, (2) well defined record keeping, (3) a withdrawal period for animals that have been administered drugs, and (4) identification of animals. A veterinarian, either on staff or on an advisory basis, would be involved in the oversight of the use of animal capture and handling drugs under the proposed action. Veterinary authorities in each state have the discretion under this law to establish withdrawal times (i.e., a period of time after a drug is administered that must lapse before an animal may be used for food) for specific drugs. Animals that might be consumed by a human within the withdrawal period must be identified; the Western Wildlife Health Committee of the Western Association of Fish and Wildlife Agencies has recommended that suitable identification markers include durable ear tags, neck collars, or other external markers that provide unique identification (WWHC *undated*). APHIS-WS establishes procedures in each state for administering drugs used in wildlife capture and handling that must be approved by state veterinary authorities in order to comply with this law.

1.8.2.9 Environmental Justice and Executive Order 12898 - "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."

Executive Order 12898, entitled, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" promotes the fair treatment of people of all races, income levels and cultures with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Environmental justice is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. It is a priority within APHIS and WS. Executive Order 12898 requires Federal agencies to make environmental justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of Federal programs, policies and activities on minority and low-income persons or populations. APHIS implements Executive Order 12898 principally through its compliance with NEPA. All WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898. WS personnel use only legal, effective, and environmentally safe wildlife damage management methods, tools, and approaches. It is not anticipated that the proposed action would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations.

1.8.2.10 Protection of Children from Environmental Health and Safety Risks (Executive Order 13045)

Children may suffer disproportionately from environmental health and safety risks for many reasons. Wildlife damage management as proposed in this EA would only involve legally available and approved damage management methods in situations or under circumstances where it is highly unlikely that children would be adversely affected. Therefore, implementation of the proposed action would not increase environmental health or safety risks to children.

1.8.2.11 Executive Order 13112 - Invasive Species

Executive Order 13112 directs Federal agencies to use their programs and authorities to prevent the spread or to control populations of invasive species that cause economic or environmental harm, or harm to human health.

1.8.3 Compliance with other State and Federal Laws

1.8.3.1 Owner May Protect Property 3CSR10-4.130

This regulation authorizes landowners or agents of the landowner to protect property, subject to federal regulations from migratory birds, any wildlife except deer, turkey, and any endangered species which beyond reasonable doubt is damaging property may be capture or killed at any time with out a permit. Deer, turkey, and endangered species that are causing damage maybe killed only with the permission of an agent of the department, and by methods authorized by the agent.

2.0 CHAPTER 2 - ISSUES

Chapter 2 contains a discussion of the issues, including issues that will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences), issues that have driven the development of mitigation measures and/or standard operating procedures, and issues that will not be considered in detail, with rationale. Pertinent portions of the affected environment will be included in this chapter in the discussion of issues used to develop mitigation measures. Additional description of affected environments will be incorporated into the discussion of the environmental impacts in Chapter 4.

Affected Environment

The affected areas include all private and public airport properties and their adjacent properties throughout Indiana. Virtually all airports in the state of Indiana contain similar types of habitat such as woodlands, wetlands, grasslands, croplands, and suburban areas. Thus, airports in Indiana may deal with similar types of hazards caused by wildlife. Airport properties include the AOA and usually some leased properties, which may involve agriculture, commercial, natural resources, and residential areas. Potentially WS could be called upon to conduct WDM on any of the 28 airports in Indiana, including any adjacent properties that are negatively impacting or have the potential to negatively impact airport operations. Any adjacent properties not under airport authority would be dealt with under a separate agreement.

2.1 Issues. The following issues have been identified as areas of concern requiring consideration in this EA. These will be analyzed in detail in Chapter 4:

Effects on Target Wildlife Species Populations
Effects on Other Wildlife Species Populations, including T&E Species
Effects of Damage to Property from Wildlife Strikes
Effects on Human Health and Safety
Effects on Aesthetics
Humaneness and Animal Welfare Concerns of Lethal Methods Used by WS

2.2 Issues Addressed in the Analysis of Alternatives

2.2.1 Effects on Target Wildlife Species Populations

A common concern among members of the public is whether wildlife damage management actions adversely affect the viability of target species populations. The target species selected for analysis in this EA are the mammal and bird species listed in section 1.2. A minimal number of individuals are likely to be killed by WS's use of lethal control methods under the proposed action in any one year.

2.2.2 Effects on Non-target Species populations, including T&E Species

A common concern among members of the public and wildlife professionals, including WS personnel, is the impact of damage control methods and activities on non-target species, particularly Threatened and Endangered Species. WS's standard operating procedures include measures intended to mitigate or reduce the effects on non-target species populations and are presented in Chapter 3.

Special efforts are made to avoid jeopardizing Threatened and Endangered Species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. WS has consulted with the USFWS under Section 7 of the Endangered Species Act (ESA) concerning potential impacts of WDM methods on T&E species and has obtained a Biological Opinion (B.O.). For the full context of the B.O., see Appendix F of the ADC FEIS (USDA 1997, Appendix F). WS is also in the process of reinitiating Section 7 consultation at the program level to assure that potential effects on

T&E species have been adequately addressed.

2.2.3 Economic Losses to Property as a Result of Wildlife Damage

A major concern by the many airports is the economic impact of wildlife damage to aircraft and other property. These people are concerned as to whether the proposed action or any of the alternatives would reduce such damage to more acceptable levels. Wildlife has and could cause damage to aircraft and property as describe in the need for action.

2.2.4 Effects on Human Health and Safety

2.2.4.1 Safety and efficacy of chemical control methods

Some individuals may have concerns that chemicals used for animal control should not be used because of potential adverse effects on people from being exposed to the chemicals directly or to the animals that have died as a result of the chemical use. Under the alternatives proposed in this EA, one of the toxicants proposed for use by WS is DRC-1339 (Starlicide), which would be primarily used to remove feral domestic pigeons and starlings or blackbirds in damage situations. The EPA through FIFRA regulates DRC-1339 use, by Indiana Pesticide Control Laws, and by WS Directives. The chemical bird repellents methyl anthranilate (Rejex-it, Goose Chase, etc.) or anthraquinone (Flight Control) could be used to reduce feeding activity on the airfield. Both methyl anthranilate and anthraquinone are non-lethal and work by causing a negative response to feeding in the treated area. Another chemical method that could be used is Avitrol, which is classified as a chemical frightening agent and is normally used to avert certain bird species from using certain problem areas. The avian tranquilizer Alpha-Chloralose could be used for live-capturing nuisance waterfowl.

In some situations, a chemical control alternative may be considered for managing nuisance mammals. Under the alternatives proposed in this EA, registered rodenticides could be used to manage damaging populations of rodents in both field and structural environments. These rodenticides fall into two basic categories: 1) anticoagulants; 2) non-anticoagulants (such as Bromethalin, Cholecalciferol, and zinc phosphide). The chemical repellents: fatty acids, putrescent egg solids, capsaicin, denatonium saccharide, and thiram may be used to reduce feeding activity or structural damage on the airfield.

Other individuals may have concerns that there is a potential for drugs used in animal capture, handling, and euthanasia to cause adverse health effects in humans that hunt and eat the species involved. Among the species to be captured and handled under the proposed action, this issue is expected to only be of concern for wildlife which are hunted and sometimes consumed by people as food. Drugs used in capturing, handling, and euthanizing wildlife for wildlife hazard management purposes include ketamine hydrochloride, xylazine (Rompun), sodium pentobarbitol, Beuthanasia-D, and a mixture of tiletamine and zolazepam (Telazol). Meeting the requirements of the AMDUCA (see section 1.8.2.8) should prevent any significant adverse impacts on human health with regard to this issue. Mitigation measures that would be part of the standard operating procedures include:

- All drug use in capturing and handling wildlife would be under the direction and authority of state veterinary authorities, either directly or through procedures agreed upon between those authorities and APHIS-WS. As determined on a state-level basis by these veterinary authorities (as allowed by AMDUCA), wildlife hazard management programs may choose to avoid capture and handling activities that utilize immobilizing drugs within a specified number of days prior to the hunting or trapping season for the

target species to avoid release of animals that may be consumed by hunters prior to the end of established withdrawal periods for the particular drugs used. Ear tagging or other marking of animals drugged and released to alert hunters and trappers that they should contact state officials before consuming the animal.

- Most animals administered drugs would be released well before state controlled hunting/trapping seasons which would give the drug time to completely metabolize out of the animals' systems before they might be taken and consumed by humans. In some instances, animals collected for control purposes would be euthanized when they are captured within a certain specified time period prior to the legal hunting or trapping season to avoid the chance that they would be consumed as food while still potentially having immobilizing drugs in their systems.

By following these procedures in accordance with AMDUCA, wildlife hazard management programs would avoid any significant impacts on human health with regard to this issue.

2.2.4.2 Impacts on human safety of non-chemical WDM methods

Some people may be concerned that WS's use of firearms, traps, snare, and pyrotechnic scaring devices could cause injuries to people. WS personnel occasionally use traps, snares, rifles and shotguns to remove wildlife that are causing damage. There is some potential fire hazard to airport property from pyrotechnic use.

2.2.4.3 Impacts on human safety from wildlife strike hazards

The concern stated here is that the absence of adequate WDM would result in adverse effects on human health and safety, because bird and mammal strikes on aircraft would not be curtailed or reduced to the minimum levels possible and practical. The potential impacts of not conducting such work could lead to increased incidence of injuries or loss of human lives from wildlife strikes to aircraft.

2.2.5 Effects on Aesthetics

2.2.5.1 Effects on Human Affectionate-Bonds with Individual animals and on Aesthetic Values of Wildlife Species

The human attraction to animals has been well documented throughout history and started when humans began domesticating animals. The American public is no exception and today a large percentage of households have pets. However, some people may consider individual wild animals and birds as "pets" or exhibit affection toward these animals, especially people who enjoy coming in contact with wildlife. Therefore, the public reaction is variable and mixed to wildlife damage management because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the best ways to manage conflicts/problems between humans and wildlife.

Some individual members or groups of wildlife species habituate and learn to live in close proximity to humans. Some people in these situations feed such birds/mammals and/or otherwise develop emotional attitudes toward such animals that result in aesthetic enjoyment. In addition, some people consider individual wild animals as "pets," or exhibit affection toward these animals. Examples would be people who visit a city park to feed waterfowl or pigeons and homeowners who have bird feeders or birdhouses. Many people do not develop emotional bonds with individual wild animals, but experience aesthetic enjoyment from observing them.

There is some concern that the proposed action or the alternatives would result in the loss of aesthetic benefits to the public, resource owners, or neighboring residents. Wildlife generally is regarded as providing economic, recreational, and aesthetic benefits (Decker and Goff 1987), and the mere knowledge that wildlife exists is a positive benefit to many people. Aesthetics is the philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics are truly subjective in nature, dependent on what an observer regards as beautiful.

Wildlife populations provide a range of social and economic benefits (Decker and Goff 1987). These include direct benefits related to consumptive and non-consumptive use (e.g., wildlife-related recreation, observation, harvest, sale), indirect benefits derived from vicarious wildlife related experiences (e.g., reading, television viewing), and the personal enjoyment of knowing wildlife exists and contributes to the stability of natural ecosystems (e.g., ecological, existence, bequest values) (Bishop 1987). Direct benefits are derived from a user's personal relationship to animals and may take the form of direct consumptive use (using up the animal or intending to) or non-consumptive use (viewing the animal in nature or in a zoo, photography) (Decker and Goff 1987). Indirect benefits or indirect exercised values arise without the user being in direct contact with the animal and come from experiences such as looking at photographs and films of wildlife, reading about wildlife, or benefiting from activities or contributions of animals such as their use in research (Decker and Goff 1987). Indirect benefits come in two forms: bequest and pure existence (Decker and Goff 1987). Bequest is providing for future generations and pure existence is merely knowledge that the animals exist (Decker and Goff 1987).

Public reaction to damage management actions is variable because individual members of the public can have widely different attitudes toward wildlife. Some individuals that are negatively affected by wildlife support removal or relocation of damaging wildlife. Other individuals affected by the same wildlife may oppose removal or relocation. Individuals unaffected by wildlife damage may be supportive, neutral, or opposed to wildlife removal depending on their individual personal views and attitudes.

The public's ability to view wildlife in a particular area would be more limited if the birds and mammals are removed or relocated. However, immigration of wildlife from other areas could possibly replace the animals removed or relocated during a damage management action. In addition, the opportunity to view or feed other wildlife would be available if an individual makes the effort to visit local wildlife management areas and other sites with adequate habitat and local populations of the species of interest.

Some people do not believe that individual animals or nuisance bird roosts should even be harassed to stop or reduce damage problems. Some of them are concerned that their ability to view birds and other wildlife species are lessened by WS non-lethal harassment efforts.

Indiana WS recognizes that all wildlife has aesthetic value and benefit. WS only conducts wildlife damage management at the request of the affected property owner or resource manager. If WS received requests from an individual or official for wildlife damage management, WS would address the issues/concerns and consideration would be made to explain the reasons why the individual damage management actions would be necessary. Management actions would be

carried out in a caring, humane, and professional manner.

2.2.5.2 Effects on Aesthetic Values of Property Damaged by Birds

Airport personnel have expressed concerns of bird roosting in trees and structures and are generally concerned about the negative aesthetic appearance of bird droppings. Costs associated with property damage include labor and disinfectants to clean/sanitize fecal droppings, implementation of non-lethal wildlife management methods, loss of property use, loss of aesthetic value of flowers, gardens, and lawns where birds are roosting, or visitors irritated by the odor of or of having to walk on fecal droppings.

2.2.6 Humaneness and Animal Welfare Concerns of Lethal Methods Used by WS.

The issue of humaneness and animal welfare, as it relates to the killing or capturing of wildlife is an important but very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate pest damage management for societal benefits could be compatible with animal welfare concerns, if " . . . the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process."

Suffering is described as a " . . . highly unpleasant emotional response usually associated with pain and distress." However, suffering " . . . can occur without pain . . ." and " . . . pain can occur without suffering . . . " (AVMA 1987). Because suffering carries with it the implication of a time frame, a case could be made for " . . . little or no suffering where death comes immediately . . . " (CDFG 1991), such as shooting.

Defining pain as a component in humaneness of WS methods appears to be a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain, and identifying the causes that elicit pain responses in humans would " . . . probably be causes for pain in other animals . . . " (AVMA 1987). However, pain experienced by individual animals probably ranges from little or no pain to significant pain (CDFG 1991).

Pain and suffering, as it relates to WS damage management methods, has both a professional and lay point of arbitration. Wildlife managers and the public would be better served to recognize the complexity of defining suffering, since " . . . neither medical or veterinary curricula explicitly address suffering or its relief" (CDFG 1991).

Therefore, humaneness, in part, appears to be a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. The challenge in coping with this issue is how to achieve the least amount of animal suffering within the constraints imposed by current technology and funding.

WS has improved the selectivity and humaneness of management techniques through research and development. The addition of approved chemical capture/euthanasia procedures has allowed WS personnel to meet veterinary humane criteria. Research is continuing to bring new findings and products into practical use. Until new findings and products are found practical, a certain amount of animal suffering could occur when some WDM mechanical methods are used in situations where non-lethal damage management methods are not practical or effective.

Indiana WS personnel are experienced and professional in their use of management methods so that they are as humane as possible under the constraints of current technology, workforce and funding. Mitigation measures/Standard Operating Procedures (SOP) used to maximize humaneness are listed in Chapter 3.

3.0 CHAPTER 3: ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter consists of 6 parts: 1) an introduction, 2) description of alternatives considered and analyzed in detail including the Proposed Action/No Action (Alternative 1), 3) a description of Integrated Wildlife Damage Management, 4) Wildlife damage management methods available for use or recommendation by WS in Indiana, 5) Alternatives considered but not in detail, with rationale, and 6) Mitigation measures and Standard Operating Procedures (SOPs) for deer damage management.

Alternatives were developed for consideration using the WS Decision Model (Slate et al. 1992), *"Methods of Control"* (USDA 1997 Appendix J) and the *"Risk Assessment of Wildlife Damage Control Methods Used by the USDA Animal Damage Control Program"* (USDA 1997, Appendix P) of USDA (1997).

Alternatives analyzed in detail are:

Alternative 1 – Implement a Federal WDM Program /Integrated Wildlife Damage Management. This is the Proposed Action and No Action Alternative.
Alternative 2 - Non-lethal WDM only, by WS.
Alternative 3 - Lethal WDM only, by WS.
Alternative 4 - No Federal WS WDM.

3.1 DESCRIPTION OF THE ALTERNATIVES

3.1.1 Alternative 1 – Implement a Federal WDM Program /Integrated Wildlife Damage Management (Proposed Action/No Action).

The proposed action is to continue the current WS program at civil and military airports in Indiana that respond to requests for WS WDM to protect property, and human health and safety at airports. An Integrated Wildlife Damage Management (IWDM) approach would be implemented which would allow use of any legal technique or method, used singly or in combination, to meet request or needs for resolving conflicts with wildlife affecting the use of the airfield and safe airport operations (Appendix B). Airport personnel requesting assistance would be provided with information regarding the use of effective non-lethal and lethal techniques. Lethal methods used by WS would include shooting, trapping, toxicants, or euthanasia following live capture by immobilization drugs or trapping. Non-lethal methods used by WS may include habitat alteration, chemical immobilization, repellents, fencing, barriers and deterrents, netting, capture and relocation, and harassment or scaring devices. In many situations, the implementation of non-lethal methods such as habitat alteration, structural modifications, and exclusion-type barriers would be the responsibility of the airport to implement. WDM by WS would be allowed on the airports and adjacent properties, when requested, where a need has been documented and upon completion of an Agreement for Control. All management actions would comply with appropriate federal, state, and local laws.

3.1.2 Alternative 2 - Non-lethal WDM Only, By WS.

This alternative would require WS to use and recommend non-lethal methods only to resolve wildlife damage problems. Requests for information regarding lethal management approaches would be referred to IDNR, FWS, local animal control agencies, or private businesses or organizations. Individuals might choose to implement WS non-lethal recommendations, implement lethal methods or other methods not recommended by WS, contract for WS direct control services, use contractual services of private

businesses, or take no action. Currently, DRC-1339 and Alpha-Chloralose are only available for use by WS employees. DEA regulated immobilizing/euthanasia drugs are available only to licensed veterinarians or other authorized users such WS personnel. Therefore, use of these chemicals by private individuals would be illegal. Under this alternative, Alpha-Chloralose or other approved capture drugs would be used by WS personnel to capture and relocate wildlife. Appendix B describes a number of non-lethal methods available for use by WS under this alternative.

3.1.3 Alternative 3 - Lethal WDM Only, By WS.

Under this alternative, WS would provide only lethal direct control services and technical assistance. Technical assistance would include making recommendations to the FWS and IDNR regarding the issuance of permits to resource owners to allow them to take wildlife by lethal methods. Requests for information regarding non-lethal management approaches would be referred to IDNR, FWS, local animal control agencies, or private businesses or organizations. Individuals might choose to implement WS lethal recommendations, implement non-lethal methods or other methods not recommended by WS, contract for WS direct control services, use contractual services of private businesses, or take no action. In some cases, control methods employed by others could be contrary to the intended use or in excess of what is necessary. Appendix B describes a number of lethal methods available for use by WS under this alternative.

3.1.4 Alternative 4 - No Federal WS WDM

This alternative would eliminate Federal WS involvement in WDM at airports in Indiana. WS would not provide direct operational or technical assistance and requesters of WS services would have to conduct their own WDM without WS input. Requests for information would be referred to IDNR, FWS, local animal control agencies, or private businesses or organizations. Individuals might choose to conduct WDM themselves, use contractual services of private businesses, or take no action. DRC-1339 and Alpha-Chloralose are only available for use by WS employees. Therefore, use of these chemicals as well as DEA controlled substances by private individuals would be illegal.

3.2 WDM Strategies and Methodologies Available to WS at airports in Indiana

The strategies and methodologies described below include those that could be used or recommended under Alternatives 1, 2, and 3 described above. Alternative 4 would terminate both WS technical assistance and operational WDM by WS. Appendix B is a more thorough description of the methods that could be used or recommended by WS.

3.2.1 Integrated Wildlife Damage Management (IWDM)

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. The philosophy behind IWDM is to implement the best combination of effective management methods in a cost-effective[1] manner while minimizing the potentially harmful effects on humans, target and non-target species, and the environment. IWDM may incorporate cultural practices (i.e., restricting flying times), habitat modification (i.e., exclusion), animal behavior modification (i.e., scaring), removal of individual offending animals, local population reduction, or any combination of these, depending on the circumstances of the specific damage problem.

3.2.2.1 Technical Assistance Recommendations

"Technical assistance" as used herein is information, demonstrations, and advice on available and appropriate wildlife damage management methods. The implementation of damage management actions is the responsibility of the requester. In some cases, WS provides supplies or materials that are of limited availability for non-WS entities to use technical assistance may be provided following a personal or telephone consultation, or during an on-site visit with the requester. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems; these strategies are based on the level of risk, need, and the practicality of their application.

Under APHIS NEPA Implementing regulations and specific guidance for the WS program, WS technical assistance is categorically excluded from the need to prepare an EA or EIS. However, it is discussed in this EA because it is an important component of the IWDM approach to resolving wildlife damage problems.

3.2.2.2 Direct Damage Management Assistance

This is the implementation or supervision of damage management activities by WS personnel. Direct damage management assistance may be initiated when the problem cannot effectively be resolved through technical assistance alone, and when Agreements for Control or other comparable instruments provide for WS direct damage management. The initial investigation defines the nature, history, extent of the problem, species responsible for the damage, and methods that would be available to resolve the problem. Professional skills of WS personnel are often required to effectively resolve problems, especially if restricted use pesticides or controlled substances are necessary, or if the problem is complex.

3.2.2.3 Examples of WS Direct Operational and Technical Assistance in WDM at airports in Indiana

WS has implemented and conducted several projects that provide both Operational and Technical Assistance (TA) at airports in Indiana. Such projects include but are not limited to the problems of coyotes (*Canas latrans*) on the airfield and runway; European starlings (*Sturnus vulgarus*) roosting on the property posing serious risk to aircraft; waterfowl bird strike risks, and raptors (birds of prey) using the airfield.

- WS has provided technical assistance and operational assistance to airports to reduce waterfowl activity on airport property and within critical air space. A combination of active harassment and habitat modification recommendations have been used to reduce the risk of bird strikes.
- WS has provided technical assistance to airport operations to reduce coyote activities on airport properties by making recommendations such as modifying the habitat and closing any gaps in the fence around the airfield. WS also monitors for the presence of coyote activity by spotlighting at night. Direct control methods employed by WS include harassment and lethal removal by sharp shooting and trapping.
- WS has provided technical assistance to airport personnel to reduce starling activities on airport properties by providing information on habitat and behavior modification, and harassment using multiple techniques. WS has also provided direct control through harassment using propane cannons, pyrotechnics, and lethal reinforcement by shooting.

- WS has provided TA to Indiana airports to reduce raptor activities on airport properties by recommending changes in habitat and harassment techniques. Direct control provided by WS has included harassment by distress calls, pyrotechnics, and a capture and relocation program.

3.2.3 WS Decision-Making

WS personnel use a thought process for evaluating and responding to damage complaints that is depicted by the WS Decision Model described by Slate et al. (1992) (Appendix C). WS personnel are frequently contacted after requesters have tried or considered non-lethal methods and found them to be impractical, too costly, or inadequate for reducing damage to an acceptable level. WS personnel assess the problem, evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic and social considerations. Following this evaluation, the methods deemed to be practical for the situation are developed into a management strategy. After the management strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for further management is ended. In terms of the WS Decision Model (Slate et al. 1992), most damage management efforts consist of continuous feedback between receiving the request and monitoring the results of the damage management strategy. The Decision Model is not a documented process, but a mental problem-solving process common to most if not all professions.

3.2.4 Wildlife Damage Management Methods Available for Use. (See Appendix B for detailed descriptions of WDM Methodologies)

3.2.4.1 Non-chemical, Non-lethal Methods (See Appendix B for detailed descriptions)

Property owner practices consist primarily of non-lethal preventive methods such as cultural methods[2] and habitat modification.

Animal behavior modification refers to tactics that alter the behavior of wildlife to reduce damages. Some but not all of these tactics include:

- Exclusions such as fencing
- Propane cannons (to scare birds and mammals)
- Pyrotechnics (to scare birds and mammals)
- Distress calls and sound producing devices (to scare birds)
- Visual repellents and scaring tactics

Relocation of damaging birds and mammals as directed by IDNR to other areas.

Nest destruction of the target species before eggs or young is in the nest.

Egg addling/destruction is the practice of destroying the embryo in the egg prior to hatching; physically breaking eggs; or directly removing eggs from a nest and destroying them.

Habitat/environmental modification to attract or repel certain wildlife species.

Live traps are various types of traps designed to capture birds and mammals alive for relocation

or euthanasia. Some examples are, snares, leg-hold traps, cage traps, clover traps, decoy traps, nest box traps, mist nets, etc.

3.2.4.2 Chemical, Non-lethal Methods (See Appendix B for detailed descriptions)

Avitrol is a chemical frightening agent registered for use on pigeons, crows, gulls, blackbirds, starlings, and English sparrows in various situations. This chemical works by causing distress behavior in the birds that consume treated kernels from a mixture of treated and untreated bait, which generally frightens the other birds from the site. Generally birds that eat the treated bait will die (Johnson and Glahn 1994).

Alpha-chloralose is used as an immobilizing agent, which is a central nervous system depressant, and used to capture waterfowl or other birds. It is generally used in recreational and residential areas, such as swimming pools, shoreline residential areas, golf courses, or resorts. Alpha-chloralose is typically delivered as a well-contained bait in small quantities with minimal hazards to pets and humans; single bread or corn baits are fed directly to the target birds.

Methyl Anthranilate (MA) (artificial grape flavoring food additive) has been shown to be an effective repellent for many bird species, including waterfowl. It can be applied to turf or surface water or as a fog to repel birds from small areas. It may also become available for use as a livestock feed additive that has bird repellent value.

Flight Control (anthraquinone) (Avery et al. 1997) The chemical bird repellent Flight Control could be used to reduce feeding activity on the airfield. Flight Control is a bio-pesticide that is non-lethal and works by causing a negative response to feeding in the treated area.

Ketamine (Ketamine HCl) is a dissociative anesthetic that is used to capture wildlife, primarily mammals, birds, and reptiles. It is used to eliminate pain, calms fear, and allay anxiety.

Telazol (tiletamine) is another anesthetic used in wildlife capture. It is 2.5 to 5 times more potent than ketamine; therefore, it generally works faster and lasts longer.

Xylazine is a sedative that calms nervousness, irritability, and excitement, usually by depressing the central nervous system. Xylazine is commonly used with ketamine to produce a relaxed anesthesia.

3.2.4.3 Mechanical, Lethal Methods (See Appendix B for detailed descriptions)

Shooting is the practice of selectively removing target species by shooting with an air rifle, shotgun, or rifle. Shooting a few individuals from a larger flock can reinforce birds' fear of harassment techniques.

Snap traps may be used to remove small rodents and may also be modified to remove individual birds such as woodpeckers.

Body grip (e.g. conibear) traps are kill traps designed to cause the quick death of the animal that activates the trap. The Conibear size 330 traps used for beaver are used exclusively in aquatic habitats, with placement depths varying from a few inches to several feet below the water surface. Smaller body grip traps, such as the size 110 used for muskrats, can be set either in or out of the water.

Cervical dislocation is sometimes used to euthanize small rodents and birds that are captured in live traps. AVMA approves this technique as humane method of euthanasia and states that cervical dislocation when properly executed is a humane technique for euthanasia of rodents, poultry, and of small birds (Beaver et al. 2001).

3.2.4.4 Chemical, Lethal Methods (See Appendix B for detailed descriptions)

DRC-1339 is an avacide for reducing damage from several species of birds, including blackbirds, starlings, pigeons, crows, ravens, magpies, and gulls. DRC-1339 is highly toxic to sensitive species but only slightly toxic to non-sensitive birds, predatory birds and mammals. This chemical would be the primary lethal chemical method used for feral domestic pigeon, starling, and blackbird damage management under the current program.

Carbon dioxide (CO2) gas is an American Veterinary Medical Association (AVMA) approved euthanasia method which is sometimes used to euthanize birds and mammals which are captured in live traps or by chemical immobilization and when relocation is not a feasible option. Live animals are placed in a container or chamber into which CO2 gas is released. The animals quickly expire after inhaling the gas.

Sodium Pentobarbital is a barbiturate that rapidly depresses the central nervous system to the point of respiratory arrest. There are DEA restrictions on who can possess and administer this drug. Some states may have additional requirements for personnel training and particular sodium pentobarbital products available for use in wildlife. Certified WS personnel are authorized to use sodium pentobarbital and dilutions for euthanasia in accordance with DEA and state regulations.

Zinc phosphide is a metallic toxicant most often used for rodent control, such as rats, mice, voles, and muskrats. It can be used to treat a variety of baits, depending on the species being controlled.

Warfin and Diphacinone are anticoagulant rodenticides used to control rodents around buildings and other structures.

3.3 Alternatives Considered But Not Analyzed in Detail with Rationale

3.3.1 Technical Assistance Only

This alternative would not allow WS operational WDM at airports in Indiana. WS would only provide technical assistance and make recommendations when requested. This alternative has been determined ineffective based upon the unsuccessful attempts by airport personnel to conduct WDM prior to WS direct control involvement. The WDM programs implemented by airport personnel prior to WS involvement were unsuccessful in preventing the wildlife strikes that prompted airport management to seek assistance by WS.

3.4 Mitigation and Standard Operating Procedures for Wildlife Damage Management Techniques

3.4.1 Mitigation in Standard Operating Procedures (SOP)

Mitigation measures are any features of an action that serve to prevent, reduce, or compensate for impacts

that otherwise might result from that action. The current WS program, nationwide and in Indiana uses many such mitigation measures and these are discussed in detail in Chapter 5 of the FEIS (USDA 1997). Some key mitigating measures pertinent to the proposed action and alternatives that are incorporated into WS's Standard Operating Procedures include:

Mitigation Measures	**Alternatives**			
	1	2	3	4
Animal Welfare and Humaneness of Methods used by WS				
Research on selectivity and humaneness of management practices would be monitored and adopted as appropriate	X	X	X	
The Decision Model (Slate et al. 1992) is used to identify effective biological and ecologically sound WDM stategies and their impacts.	X	X	X	
Captured non-target animals are relocated unless it is determined by the Indiana WS personnel that the animal would not survive	X	X	X	
The use of traps and snares conform to current laws and regulations administered by IDNR and IN WS policy.	X	X	X	
Euthanasia procedures approved by the AVMA that cause minimal pain are used for live animals.	X		X	
Drugs are used according to the Drug Enforcement Agency, FDA, and WS program policies and directives and procedures are followed that minimizes pain.	X	X	X	
The use of newly developed, proven non-lethal methods would be encouraged when appropriate.	X	X		
Safety Concerns Regarding WS WDM Methods				
All pesticides are registered with the EPA and IDNR.	X	X	X	
WS employees would follow all EPA approved label directions.	X	X	X	
All controlled substances are registered with DEA or FDA.	X	X	X	
WS employees would follow approved procedures outlined WS Field Manual for the Operational Use of Immobilizing and Euthanizing Drugs (Johnson, et al. 2001).	X	X	X	
The Decision Model (Slate et al. 1992),	X	X	X	

designed to identify the most appropriate damage management strategies and their impacts, is used to determine WDM strategies.			
WS employees that use pesticides are trained to use each material and are certified to use pesticides under EPA approved certification programs.	X	X	X
WS employees that use controlled substances are trained to use each material and are certified to use controlled substances under Agency certification program.	X	X	X
WS employees who use pesticides and controlled substances participate in State approved continuing education to keep abreast of developments and maintain their certifications.	X	X	X
Pesticide and controlled substance use, storage, and disposal conform to label instruction and other applicable laws and regulations, and Executive Order 12898.	X	X	X
Material Safety Data Sheets for pesticides and controlled substances are provided to all WS personnel involved with specific WDM activities.	X	X	X
Concerns about Impacts of WDM on Target Species, Species of Special Concern, and Non-target Species			
WS consulted with the USFWS regarding the nation-wide program and would continue to implement all applicable measure identified by the USFWS to ensure protection of T &E species.	X	X	X
Management actions would be directed toward localized populations or groups and/or individual offending animals.	X	X	X
WS personnel are trained and experienced to select the most appropriate methods for taking targeted animals and excluding non-target species.	X	X	X
WS would initiate informal consultation with the USFWS following any incidental take of T &E species.	X	X	X
The presence of non-target species is monitored before using toxicants to control rodents, starlings, blackbirds, and pigeons to reduce the risk of significant mortality of non-target species populations.	X		X

WS take is monitored by number of animals by species or species groups (i.e. blackbirds, raptors) with overall populations or trends in population to assure the magnitude of take is maintained below the level that would cause significant adverse impacts to the viability of native species populations (See Chapter 4).	X		X
WS uses chemical methods for WDM that have undergone rigorous research to prove their safety and lack of serious effects on non-target animals and the environment.	X	X	X

4.0 CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides information needed for making informed decisions in selecting the appropriate alternative for meeting the purpose of the proposed action. The chapter analyzes the environmental consequences of each alternative in relation to the issues identified for detailed analysis in Chapter 2. This section analyzes the environmental consequences of each alternative in comparison with the No Action alternative to determine if the real or potential impacts would be greater, lesser, or the same. Therefore, the proposed action alternative serves as the baseline for the analysis and the comparison of expected impacts among the alternatives. The background and baseline information presented in the analysis of the current program alternative thus also applies to the analysis of each of the other alternatives. The No Action Alternative, as defined here, is consistent with the Council on Environmental Quality (CEQ) (1981).

The following resource values within the State are not expected to be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. These resources will not be analyzed further.

Cumulative Impacts: Discussed in relationship to each of the potentially affected species analyzed in this chapter.

Irreversible and Irretrievable Commitments of Resources: Other than minor uses of fuels for motor vehicles and other materials, there are no irreversible or irretrievable commitments of resources.

Impacts on sites or resources protected under the National Historic Preservation Act: WS WDM actions are not undertakings that could adversely affect historic resources (See Section 1.8.2.5).

4.1 Environmental Consequences for Issues Analyzed in Detail

4.1.1 Effects on Target Species Wildlife Populations

4.1.1.1 Alternative 1. - Implement a Federal Wildlife Damage Management (Proposed Action/No Action)

Analysis of this issue is limited primarily to those species most often killed during WS WDM. The analysis for magnitude of impact generally follows the process described in Chapter 4 of USDA (1997). Magnitude is described in USDA (1997) as " . . . *a measure of the number of animals killed in relation to their abundance*." Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations are based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations are based on population trends and harvest data when available. Generally, WS only conducts damage management on species whose population densities are high and usually only after they have caused damage. Table 4-1 shows the numbers of birds and mammals killed by species and methods as a result of WS WDM activities at IN airports from FY 2000. WS's activities in resolving wildlife damage have been more than 86% non-lethal -- for example; for the 1-year period of FY 2000, the number of mixed blackbirds species including starlings, red-winged blackbirds, and common grackles killed by WS personnel was 21, while the number moved by use of harassment with pyrotechnics totaled an estimated 14,325. Based upon an anticipated increase in future requests for WS assistance at IN airports, WS predicts that no more than 500 mixed blackbird species would be lethally removed annually. Under this alternative the number of birds and mammals would likely remain the same or not change substantially from current levels.

Table 4-1. Wildlife Lethally Removed by WS for Wildlife Damage Management in FY 2000 at IN Airports.

Species	Damage Management Methods									
	Alpha Chloro-lose	DRC-1339/Gas Cart.	Body Gripping Trap	Other Trap	Cage Trap	Shooting	Leghold Trap	Egg Destruction/Nest Removal	Snares	Hand Caught
Mixed Blackbird Species						9				
Red-winged Blackbird						2				
Coyote						16	5			
American Crow						2				
European Starling						11				
Mourning Dove						10				
Common Grackles						1				
Ringed-billed Gulls						4				
Great Blue Heron						4				
Killdeer						5				
Horned Larks						3				
Meadow Larks						6				
Mallards						8				
Pigeons						33		9		
Raccoon							1			

Table 4-2 Wildlife Harassed and Lethally Removed by WS for Wildlife Damage Management in FY 2000 at IN Airports.

Species	**Dispersed/Freed**	**Killed**
Black Birds Mixed Species	14,327	9
Am. Crow	34	2
Species (cont.)	**Dispersed/Freed**	**Killed**
European Starling	7060	21
Mourning dove	432	10
Mallards	166	8
Canada Geese	50	0
Grackles	29	1
Gulls	105	4
Upland Sandpipers	8	0
House Sparrow	26	0
Great Blue Herons	14	4
Hawks /Kestrels	63	0
Killdeer	55	5

Horned Lark	257	3
Purple Finch	10	0
Purple Martin	0	0
Meadow lark	145	6
Nighthawk	0	0
Owls	0	0
Pigeons	7	33
Am Robin	0	0
Swallows – Tree, barn, & cliff.	35	2
Turkey Vultures	10	0
Coyotes	0	20
Deer	0	0
Dogs (feral)	4	0
Field Mice	0	0
Feral Cats	1	0
Fox	1	0
Opossum	4	1
Raccoon	0	1
Skunks	0	0

Starling and Blackbird Population Impacts

Colonization of North America by the European Starling began on March 6, 1890 when a Mr. Eugene Scheifflin, a member of the Acclimatization Society, released 80 starlings into New York's Central Park. The birds thrived and exploited their new habitat. By 1918, the advance line of migrant juveniles extended from Ohio to Alabama; by 1926 from Illinois to Texas; by 1941 from Idaho to New Mexico; and by 1946 to California and Canadian coasts (Miller 1975). In just 50 short years the starling had colonized the United States and expanded into Canada and Mexico and 80 years after the initial introduction had become one of the most common birds in North America (Feare 1984).

Precise counts of blackbird and starling populations do not exist but one estimate placed the United States summer population of the blackbird group at over 1 billion (USDA 1997) and the winter population at 500 million (Royall 1977). The majority of these birds occur in the eastern U.S.; for example surveys in the southeastern part of the country estimated 350 million blackbirds and starlings in winter roosts (Bookhout and White 1981). Meanley and Royal (1976) estimated 538 million blackbirds and starlings in winter roosts across the country during the winter of 1974-75. The nationwide starling population has been estimated at 140 million (Johnson and Glahn 1994).

Breeding Bird Survey data from Hines et al. (1998) indicate a slight increase (0.8% per year) in the starling breeding population in the mid-west U.S. from 1966 -1998, and a slight decrease (2.7% per year) from 1980 - 1994. Breeding Bird Survey data for Indiana indicates starling populations stable or slightly increasing from 1980 to 1998. Red-winged blackbirds showed a stable population in the Indiana and slightly down (0.4% per year) in the central region of the United States. Brown-headed cowbirds showed a steady increase of 2.3% from 1968 to 1979 and a slight decline from 1980 to 1998 with a decline of 0.6%(Sauer et al. 2000).

All of the above information indicates that populations of starlings and blackbirds have been relatively stable in recent years. For most species that show upward or downward trends, such trends have been relatively gradual. Additionally, blackbird populations are healthy enough, and the problems they cause great enough, that the USFWS has established a standing depredation order for use by the public. Under this "order" (50 CFR 21.43), no Federal permit is required by anyone to remove blackbirds if they are committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance.

During FY 2000, IN WS personnel at IN Airports lethally took 9 blackbirds and 21 European starlings off the flightlines and airfields. States in the WS Eastern Region reported a total kill of between 67,416 and 243,110 blackbirds and starlings per year. The average annual reported kill was 131,068 blackbirds and starlings (data from WS MIS system). No other sources of major human-caused blackbird and starling mortality are known.

Natural mortality in blackbird populations is between 50% and 65% of the population each year, regardless of human-caused control operations (USDA 1997). Annual populations of the blackbird group in the eastern U.S. is at least 372 million, of which an estimated 140 million are starlings (Meanley and Royall 1976, Johnson and Glahn 1994). Therefore the estimated natural mortality of the blackbird group in the eastern U.S should be between 186 and 241 million birds annually. WS kill of blackbirds and starlings at Indiana airports has been less than 0.000000016% of the estimated natural mortality of these populations, and would be expected to be no more than 0.004% of total mortality in any one year under the current program. Regionally, WS's *confirmed kill*, which may be underestimated, averages less than a 131,068 blackbirds and starlings annually, which accounts for only 0.005% of the natural mortality. Even if WS's actual regional kill is much higher than the "confirmed" kill, it should continue to be well below normal mortality levels for these populations.

Dolbeer et al. (1995) showed that WS kills of 3.6% of the wintering population had no effect on breeding populations the following spring. Dolbeer et al. (1976) constructed a population model which indicated that a reduction of 14.8% of the wintering blackbird population would reduce the spring breeding population by 20% and that a 56.2% reduction in the wintering blackbird population would reduce spring breeding populations by only 33%. Given the density-dependent relationships in a blackbird population (i.e. decreased mortality and increased fecundity of surviving birds) a much higher number would likely have to be killed in order to impact the regional breeding population.

Cumulative impacts would be mortality caused by the IN WS program added to the other known human causes of mortality. Given that the maximum annual mortality caused by the IN WS program has not accounted for more than 0.000000016% of the regional blackbird population, and should not exceed 0.004% of the population in any future year. When added to the regional WS confirmed kill, the cumulative impacts of the proposed control projects implemented under this alternative is expected to have no significant impact on overall breeding populations.

Starlings, being non-indigenous and because of their negative impacts and competition with native birds, are considered by many wildlife biologists and ornithologists to be an undesirable component of North American wild and native ecosystems. Any reduction in starling populations in North America, even to the extent of complete eradication, could be considered a beneficial impact to native bird species.

Feral Domestic Pigeon Population Impacts

The feral domestic pigeon, also known as the rock dove, is an introduced nonnative species in North America. Breeding Bird Survey data indicate the species has been stable across the western United States from 1967 through 1995 (Sauer et al. 1997). Federal or state law does not protect the species. Any WDM involving lethal control actions by WS for this species would be restricted to isolated, individual sites, or communities. In those cases where feral domestic pigeons are causing damage or are a nuisance, complete removal of the local population could be achieved. This would be considered to be a beneficial impact on the human environment since the affected property owner or administrator would request it. Although regional population impacts would be minor, even if significant regional or nationwide reductions could be achieved, this would not be considered an adverse impact on the human environment because the species is not part of native ecosystems. However, some individuals who experience aesthetic enjoyment of pigeons may consider major population reduction in some localities a negative impact.

During FY 2000, IN WS @ IN Airports took 33 pigeons, primarily to reduce hazards associated with dropping and damage in and around the terminal building. This number of pigeons taken at multiple sites undoubtedly had little effect on overall pigeon populations in Indiana. Based upon an anticipated increase in future requests for WS assistance at IN airports, WS predicts that no more than 250 pigeons would be lethally removed annually.

Canada Geese

Canada geese (*Branta canadensis*) are a large waterfowl that is found throughout North America. Breeding Bird Survey data indicates the species has been growing quickly within Indiana from 1966 to 1998 (Sauer et al. 2000). Canada geese are a widespread occupant of open areas, ponds and wetlands. Their primary diet is vegetative matter that includes items such as grass, corn, and soybeans. Canada geese are also very adaptive to urban settings and often thrive in areas such as public parks and airport retention ponds. The hazards that these birds present to human health and safety are tremendous. The Canada goose is responsible for more than 82 million dollars in damage to USAF aircraft in sixty collisions (USAF BASH Web site 2000).

The state of Indiana monitors populations and sets harvest dates and limits governed by USFWS guidelines. The IDNR Mid-Winter 2000 Canada goose count of 17,858 which was lower than that in January 1999 (44,578). This was due primarily to the lack of cold weather and poor dry habitat conditions. Goose migration is largely dependent on weather conditions, especially in Michigan and Wisconsin (IDNR letter, Miller 2001). Habitat conditions in 2000 were also poor. Wetlands were dry in much of the state, and crops that year were average to below average. The 2001 season in Indiana allowed the following harvest: in the North Zone, the SJBP Zone, the South Zone, the Ohio River Zone**,** and Posey County Zone, bag limit is 2 Canada geese daily (6 in possession). In the Posey County Zone, the season ended on Jan. 31 or when a quota of 960 geese reached Hovey Lake FWA. In FY 2001, WS at IN airports did not take any birds, while harassing more than 500 birds from it's airfield. Statewide, the Canada goose harvest in 1999-2000 numbered 38,451. Based upon an anticipated increase in future requests for WS assistance at IN airports, WS predicts that no more than 100 geese would be lethally removed annually. Therefore, WS limited take should have minimal effects on Canada goose populations.

Raptors

Birds of prey (raptors), such as owls, hawks, falcons, eagles, osprey, and vultures, are hazards to human safety and aircraft operations at airports because of their size, hunting behavior, and hovering/soaring habits (Blokpoel 1976). In spite of the large size and loud noise of incoming and departing aircraft, raptors are generally hesitant to yield aerial territory and therefore are frequently struck (Blokpoel 1976). The combination of abundant food sources, open space, and numerous perching structures on airport grounds and near runway/taxiway areas provides ideal hunting opportunities for many raptors (Blokpoel 1976). In addition to actual bird-aircraft collisions, many raptors are killed by the jet wash associated with large jet aircraft.

Breeding Bird Survey data indicates that raptors have been stable to increasing throughout the Mid-west (Sauer et. al 2000). Raptors are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. In FY 2000, WS at Indiana airports has trapped and relocated a total of 11 birds (8 American kestrels and 3 red-tailed hawks), harassed more than 30 birds, and has taken 0 raptors via lethal control. Based upon an anticipated increase in future requests for WS assistance at IN airports, WS predicts that no more than 10 of each species of raptor would be lethally removed annually. Therefore, WS limited take should have minimal effects on raptor populations.

Killdeer

The killdeer is an upland shorebird with two black bands around its neck. It has a brown back and a white belly. The bird is technically classified as a shorebird, but is actually found in a variety of open areas, even concrete or asphalt parking lots at shopping malls, as well as fields and beaches, ponds, lakes, road-side ditches, mudflats, airports, pastures, and gravel roads and levees (Mumford 1984). The killdeer was formerly a common summer resident throughout the state and in some years remained in southern Indiana all winter. There has been a substantial increase in the numbers of killdeers in Indiana, for today they are abundant during migration and during the summer (Mumford 1984). The bird undoubtedly nests in every county in Indiana (Mumford 1984).

Killdeer are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. In FY 2000, WS at Indiana airports took a maximum of 5 killdeer, while harassing more than 120. Based upon an anticipated increase in future requests for WS assistance at IN airports, WS predicts that no more than 50 killdeer would be lethally removed annually. Therefore, WS limited take should have minimal effects on killdeer populations.

Abundance and Distribution of Deer

The IDNR is responsible for the management and monitoring of the states White-tailed deer (*Odocoileus virginianus*), which is done through examination of harvest data, a deer- vehicle collision index, a crop damage index, and deer hunter and farm operator survey data. The state has also discontinued statewide deer zones, and manages the deer herd on a statewide basis. The IDNR who is the agency responsible for the management of deer concurs that the action take by WS will not have any negative impacts on the state's deer population (MDC Letter 2000). WS work at airports in Indiana has resulted in no removal of white-tailed deer during FY 2000. This is a minimal number of animals compared to the states 2000/2001 harvest 98,725 deer (IDNR letter, Walker 2001). Based upon an anticipated increase in future requests for WS assistance at IN airports, WS predicts that no more than 25 white-tailed deer would be lethally removed annually.

Overall, the state's deer population is healthy and productive (Walker 2001). Though the state wide deer population has remained relatively stable for the past several years, significant increases

in local areas have occurred. These increases are likely due to a number of factors, including 1. Poor hunter access to land occupied by deer, 2. Local and state ordinances limiting hunting and/or discharge and use of firearms and bows, 3.Improved habitat and better management practices. In Indiana, there were approximately 10,900 deer-vehicle collisions in 1999, with many collisions and near misses going unreported (Walker 2000).

Furbearers

The IDNR is responsible for the management of the state's furbearer (i.e. raccoon, coyote, fox, beaver, etc.) populations. At this time IDNR does not conduct population census for these species, but does monitor the sale of hides. Currently, IDNR has open seasons that are as follows: Red or Gray Fox and Coyote may be hunted from 10/15/01 to 2/28/02; Raccoon and Opossum may be hunted from 11/8/01 to 1/31/02; Dog running (Raccoon and Opossum) may be done between 2/15/01 and 10/14/01; taking season is 11/8/01 to 1/31/02. Trapping seasons in Indiana are as follows: Beaver, 11/15/01-3/15/02; Long-tailed weasel, Mink, Muskrat, Raccoon, and Opossum, 11/15/01-1/31/02; Skunk, Red Fox, Gray Fox, and Coyote, 10/15/01-1/31/02. There are no daily bag or possession limits. During the 1998-99 fur harvest season, IDNR recorded a total of 199,432 pelts bought by Indiana fur buyers.

During FY 2000 WS killed 22 individual furbearers including 20 coyote, 1 opossum, and 1 raccoon. Based upon an anticipated increase in future requests for WS assistance at IN airports, WS anticipates that no more than 200 individual furbearers of those listed in Section 1.2 would be lethally removed annually. With the states liberal harvest regulations, the magnitude of WS take on these species would be minimal.

This is supported by the basic biology of many furbearing species. For example, the muskrat is prolific, and may have three to five litters during the summer (Mumford 1982). Females come into heat about every 30 days during the breeding season (April to August) (Mumford 1982). The first litter, which may contain 12 to 15, are born in March, and can have their own litter before fall arrives. If a pair of muskrats and their offspring all survived to breed as soon as possible, they could produce over 600 muskrats in just 2 years.

Rodents

Rodents such as rats, feral mice, voles, and white-footed mice are common prey species found on airports, which in turn attract raptors to the airport environments. Any direct control for such rodents would be done to help prevent raptors from hunting near runways and taxiways. Impacts to such rodents would be minimal because any rodent control would be localized within the airport perimeters, and is supported by the high reproductive rate of these rodents (Mumford 1982).

Other Target Species

Target species, in addition to those analyzed above, have been killed in small numbers by WS during the past year and have included include no more than 20 individuals of a given species (Table 4-1). Other species that could be killed during WDM include any of the species listed in Section 1.2. None of these species are expected to be taken by WS WDM at any level that would adversely affect populations.

4.1.1.2 Alternative 2 - Non-lethal WDM only, by WS

Under this alternative, WS would not lethally take any target species and only non-lethal WDM activities and technical assistance recommendations would be made or implemented. Although WS take of target wildlife species would not occur, it is likely that, without WS conducting some level of lethal WDM activities, airport personnel or outside contractors WDM efforts would increase, leading to similar or greater impacts on target species populations as those of the current program alternative. For the same reasons shown in the population impacts analysis in section 4.1.1.1, it is unlikely that target wildlife populations would be adversely affected by implementation of this alternative.

4.1.1.3 Alternative 3 - Lethal WDM only, by WS

Under this alternative, WS would likely have a greater impact on the target species population at airports in Indiana than Alternative 1. Only lethal WDM activities would be implemented to resolve wildlife damage in all situations. WS would not recommended or use any non-lethal WDM activities to reduce wildlife damage at such airports. It is likely that a greater number of birds and mammals would likely have to be removed lethally to attempt to achieve the same results as the proposed action. However based upon the information described in section 4.1.1.1, it is unlikely that target species populations would be adversely affected by implementation of this alternative.

4.1.1.4 Alternative 4 -No Federal WS WDM

Under this alternative, WS would have no impact on target species populations at airports in Indiana. Increased airport personnel/contractors' efforts to reduce or prevent wildlife conflict could result in negative impacts on target species populations to an unknown degree. Impacts on target species under this alternative could be the same, less, or more than those of the proposed action, depending on the level of effort expended by airport personnel/contractors. However, it is unlikely that target wildlife populations would be adversely affected by implementation of this alternative.

4.1.2 Effects on Non-target Species Populations, including Threatened and Endangered Species.

4.1.2.1 Alternative 1 – Implement a Federal Wildlife Damage Management (Proposed Action/No Action)

Adverse Impacts on Non-target (non-T&E) Species. There has been no take of non-target species by WS during WDM activities on Indiana airports. While every precaution is taken to safeguard against taking non-target species, at times changes in local animal movement patterns and other unanticipated events could result in the incidental take of unintended species. These occurrences are rare and should not affect the overall populations of any species under the current program.

T&E Species Impacts. T&E species that are federally listed (or proposed for listing) for the State of Indiana are:

FEDERAL: LE=endangered, LT=threatened, LELT=different listings for specific ranges of species, PE=proposed endangered, PT=proposed threatened, E/SA=appearance similar to LE or LT species, **=not listed.

STATE: SX=extirpated, SE=endangered, ST=threatened, SR=rare, SSC=special concern, WL=watch list, SG=significant, SRE=state reintroduced.

Mammal

Species Name	Common Name	FED.	STATE
BOS BISON	AMERICAN BISON	**	SX
CANIS LUPUS	GRAY WOLF	LELT	SX
CANIS RUFUS	RED WOLF	LEXN	SX
CERVUS ELAPHUS	WAPITI OR ELK	**	SX
CONDYLURA CRISTATA	STAR-NOSED MOLE	**	SSC
CORYNORHINUS RAFINESQUII	RAFINESQUE'S BIG-EARED BAT	**	SSC
ERETHIZON DORSATUM	COMMON PORCUPINE	**	SX
FELIS CONCOLOR	COUGUAR/MOUNTAIN LION	LE	SX
FELIS LYNX	LYNX	**	SX
GEOMYS BURSARIUS	PLAINS POCKET GOPHER	**	SSC
GULO GULO	WOLVERINE	**	SX
LUTRA CANADENSIS	NORTHERN RIVER OTTER	**	SE
LYNX RUFUS	BOBCAT	**	SE
MARTES PENNANTI	FISHER	**	SX
MUSTELA NIVALIS	LEAST WEASEL	**	SSC
MYOTIS AUSTRORIPARIUS	SOUTHEASTERN MYOTIS	**	SE
MYOTIS GRISESCENS	GRAY MYOTIS	LE	SE
MYOTIS SODALIS	INDIANA OR SOCIAL MYOTIS	LE	SE
NEOTOMA MAGISTER	EASTERN WOODRAT	**	ST
NYCTICEIUS HUMERALIS	EVENING BAT	**	SE
RATTUS RATTUS	BLACK RAT	**	SX
REITHRODONTOMYS MEGALOTIS	WESTERN HARVEST MOUSE	**	SSC
SOREX FUMEUS	SMOKY SHREW	**	SSC
SOREX HOYI	PYGMY SHREW	**	SSC
SPERMOPHILUS FRANKLINII	FRANKLIN'S GROUND SQUIRREL	**	ST
SPILOGALE PUTORIUS	EASTERN SPOTTED SKUNK	**	SX
SYLVILAGUS AQUATICUS	SWAMP RABBIT	**	SE
TAXIDEA TAXUS	AMERICAN BADGER	**	ST
URSUS AMERICANUS	BLACK BEAR	T(S/A)	SX

Bird

ACCIPITER COOPERII	COOPER'S HAWK	**	WL
ACCIPITER STRIATUS	SHARP-SHINNED HAWK	**	SSC
AIMOPHILA AESTIVALIS	BACHMAN'S SPARROW	**	SE
AMMODRAMUS HENSLOWII	HENSLOW'S SPARROW	**	ST
ARDEA ALBA	GREAT EGRET	**	SE
ARDEA HERODIAS	GREAT BLUE HERON	**	SSC
ASIO FLAMMEUS	SHORT-EARED OWL	**	SE
ASIO OTUS	LONG-EARED OWL	**	WL
BARTRAMIA LONGICAUDA	UPLAND SANDPIPER	**	SE
BOTAURUS LENTIGINOSUS	AMERICAN BITTERN	**	SE
BUTEO LINEATUS	RED-SHOULDERED HAWK	**	SSC
BUTEO PLATYPTERUS	BROAD-WINGED HAWK	**	SSC
CERTHIA AMERICANA	BROWN CREEPER	**	WL

CHARADRIUS MELODUS	PIPING PLOVER	LELT	SE
CHLIDONIAS NIGER	BLACK TERN	**	SE
CIRCUS CYANEUS	NORTHERN HARRIER	**	SE
CISTOTHORUS PALUSTRIS	MARSH WREN	**	SE
CISTOTHORUS PLATENSIS	SEDGE WREN	**	ST
CORAGYPS ATRATUS	BLACK VULTURE	**	WL
CORVUS CORAX	COMMON RAVEN	**	SX
CYGNUS BUCCINATOR	TRUMPETER SWAN	**	SE
DENDROICA CERULEA	CERULEAN WARBLER	**	SSC
DENDROICA KIRTLANDII	KIRTLAND'S WARBLER	LE	SE
EGRETTA CAERULEA	LITTLE BLUE HERON	**	WL
EMPIDONAX MINIMUS	LEAST FLYCATCHER	**	WL
EUPHAGUS CYANOCEPHALUS	BREWER'S BLACKBIRD	**	SX
FALCO PEREGRINUS	PEREGRINE FALCON	E(S/A)	SE
GAVIA IMMER	COMMON LOON	**	SX
GRUS CANADENSIS	SANDHILL CRANE	**	ST
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	LTNL	SE
HELMITHEROS VERMIVORUS	WORM-EATING WARBLER	**	SSC
ICTINIA MISSISSIPPIENSIS	MISSISSIPPI KITE	**	SSC
IXOBRYCHUS EXILIS	LEAST BITTERN	**	SE
LANIUS LUDOVICIANUS	LOGGERHEAD SHRIKE	**	SE
MNIOTILTA VARIA	BLACK-AND-WHITE WARBLER	**	SSC
NYCTANASSA VIOLACEA	YELLOW-CROWNED NIGHT-HERON	**	SE
NYCTICORAX NYCTICORAX	BLACK-CROWNED NIGHT-HERON	**	SE
PANDION HALIAETUS	OSPREY	**	SE
PHALACROCORAX AURITUS	DOUBLE-CRESTED CORMORANT	**	SX
PHALAROPUS TRICOLOR	WILSON'S PHALAROPE	**	SX
RALLUS ELEGANS	KING RAIL	**	SE
RALLUS LIMICOLA	VIRGINIA RAIL	**	SSC
STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	LENL	SE
STERNA FORSTERI	FORSTER'S TERN	**	SX
STERNA HIRUNDO	COMMON TERN	**	SX
STURNELLA NEGLECTA	WESTERN MEADOWLARK	**	SSC
THRYOMANES BEWICKII	BEWICK'S WREN	**	SE
TYMPANUCHUS CUPIDO	GREATER PRAIRIE-CHICKEN	**	SX
TYTO ALBA	BARN OWL	**	SE
VERMIVORA CHRYSOPTERA	GOLDEN-WINGED WARBLER	**	SE
WILSONIA CANADENSIS	CANADA WARBLER	**	SSC
WILSONIA CITRINA	HOODED WARBLER	**	SSC
XANTHOCEPHALUS XANTHOCEPHALUS	YELLOW-HEADED BLACKBIRD	**	ST

Amphibian

ACRIS CREPITANS	NORTHERN CRICKET FROG	**		G5	S?
AMBYSTOMA BARBOURI	STREAMSIDE SALAMANDER	**	WL	G4	S3
AMBYSTOMA LATERALE	BLUE-SPOTTED SALAMANDER	**	SSC	G5	S2
ANEIDES AENEUS CRYPTOBRANCHUS	GREEN SALAMANDER	**	SE	G3G4	S?
ALLEGANIENSIS ALLEGANIENSIS	HELLBENDER	**	SE	G4T4	S1
HEMIDACTYLIUM SCUTATUM	FOUR-TOED SALAMANDER	**	ST	G5	S2
NECTURUS MACULOSUS	MUDPUPPY	**	SSC	G5	S2
PLETHODON RICHMONDI PSEUDOTRITON	RAVINE SALAMANDER	**	WL	G5	S2
RUBER RUBER	NORTHERN RED SALAMANDER	**	SE	G5T5	S1
RANA AREOLATA CIRCULOSA	NORTHERN CRAWFISH FROG	**	ST	G4T4	S2
RANA BLAIRI	PLAINS LEOPARD FROG	**	SSC	G5	S2
RANA PIPIENS	NORTHERN LEOPARD FROG	**	SSC	G5	S2
SCAPHIOPUS HOLBROOKII HOLBROOKII	EASTERN SPADEFOOT	**	SSC	G5T5	S2

Reptiles

AGKISTRODON PISCIVORUS LEUCOSTOMA	WESTERN COTTONMOUTH	**	ST	G5T5	S1
CEMOPHORA COCCINEA COPEI	NORTHERN SCARLET SNAKE	**	ST	G5T5	S1
CLEMMYS GUTTATA	SPOTTED TURTLE	**	ST	G5	S2
CLONOPHIS KIRTLANDII	KIRTLAND'S SNAKE	**	ST	G2	S2
CROTALUS HORRIDUS	TIMBER RATTLESNAKE	**	ST	G5	S2
EMYDOIDEA BLANDINGII	BLANDING'S TURTLE	**	SE	G4	S2
FARANCIA ABACURA REINWARDTII	WESTERN MUD SNAKE	**	SX	G5T5	SX
KINOSTERNON SUBRUBRUM	EASTERN MUD TURTLE	**	ST	G5	S2
MACROCLEMYS TEMMINCKII	ALLIGATOR SNAPPING TURTLE	**	SE	G3G4	S1
NERODIA ERYTHROGASTER NEGLECTA	COPPERBELLY WATER SNAKE	PT	ST	G5T2	S2
OPHEODRYS AESTIVUS	ROUGH GREEN SNAKE	**	SSC	G5	S3
OPHEODRYS VERNALIS	SMOOTH GREEN SNAKE	**	ST	G5	S2
OPHISAURUS ATTENUATUS	SLENDER GLASS LIZARD	**		G5	S2
PSEUDEMYS CONCINNA HIEROGLYPHICA	HIEROGLYPHIC RIVER COOTER	**	SE	G5T4	S1
SISTRURUS CATENATUS CATENATUS	EASTERN MASSASAUGA	**	ST	G3G4T3	S2
TANTILLA CORONATA	SOUTHEASTERN CROWNED SNAKE	**	ST	G5	S1
TERRAPENE ORNATA	ORNATE BOX TURTLE	**	SSC	G5	S2
THAMNOPHIS BUTLERI	BUTLER'S GARTER SNAKE	**	ST	G5	S1
THAMNOPHIS PROXIMUS	WESTERN RIBBON SNAKE	**	SSC	G5	S3

Beetles

BATRISODES KREKELERI	CAVE BEETLE	**	SE	G1	S1
CICINDELA MARGINIPENNIS	COBBLESTONE TIGER BEETLE	**	SE	G2G3	S1
CICINDELA PATRUELA	A TIGER BEETLE	**		G3	S3
DRYOBIUS SEXNOTATUS	SIX-BANDED LONGHORN BEETLE	**	ST	G?	S?
DYNASTES TITYUS	UNICORN BEETLE	**	SR	G?	S2
LISSOBIOPS SERPENTINUS	A ROVE BEETLE	**	SE	G?	S1
NICROPHORUS AMERICANUS	AMERICAN BURYING BEETLE	LE	SX	G1	SH
OCHTHEBIUS PUTNAMENSIS	INDIANA OCHTHEBIUS MINUTE MOSS BEETLE	**	SR	GH	S2
PSEUDANOPHTHALMUS BARRI	CAVE BEETLE	**	SE	G1	S1
PSEUDANOPHTHALMUS CHTHONIUS	CAVE BEETLE	**	SE	G1	S1
PSEUDANOPHTHALMUS EMERSONI	CAVE BEETLE	**	SE	G1	S1
PSEUDANOPHTHALMUS EREMITA	CAVE BEETLE	**	SE	G1	S1
PSEUDANOPHTHALMUS JEANNELI	CAVE BEETLE	**	SE	G?	S1
PSEUDANOPHTHALMUS LEONAE	CAVE BEETLE	**	SE	G1	S1
PSEUDANOPHTHALMUS SHILOHENSIS	CAVE BEETLE	**	SE	G1	S1
PSEUDANOPHTHALMUS SHILOHENSIS BOONENSIS	CAVE BEETLE	**	SE	G?	S1
PSEUDANOPHTHALMUS SHILOHENSIS MAYFIELDENSIS	CAVE BEETLE	**	SE	G?	S1
PSEUDANOPHTHALMUS TENUIS	CAVE BEETLE	**	ST	G2	S2
PSEUDANOPHTHALMUS TENUIS BLATCHLEYI	CAVE BEETLE	**	SE	G?	S1
PSEUDANOPHTHALMUS TENUIS MORRISONI	CAVE BEETLE	**	SE	G?	S1
PSEUDANOPHTHALMUS YOUNGI	CAVE BEETLE	**	SE	G1	S1
PSEUDANOPHTHALMUS YOUNGI DONALDSONI	CAVE BEETLE	**	SE	G?	S1

Dragonflies, Damselflies

AESHNA CANADENSIS	CANADA DARNER	**		G5	S1
AESHNA CLEPSYDRA	MOTTLED DARNER	**		G4	S1S2
AESHNA MUTATA	SPATTERDOCK DARNER	**		G3G4	S2S3
AESHNA TUBERCULIFERA	BLACK-TIPPED DARNER	**		G4	S2
ANAX LONGIPES ARCHILESTES GRANDIS	GREAT SPREADWING	**		G5	S4
ARIGOMPHUS CORNUTUS	HORNED CLUBTAIL	**		G4	S1
ARIGOMPHUS FURCIFER	LILYPAD CLUBTAIL	**		G5	S1
ARIGOMPHUS LENTULUS	STILLWATER CLUBTAIL	**		G5	S1
ARIGOMPHUS VILLOSIPES	UNICORN CLUBTAIL	**		G5	S2
CALOPTERYX AEQUABILIS	RIVER JEWELWING	**		G5	S1
CALOPTERYX ANGUSTIPENNIS	APPALACHIAN JEWELWING	**		G4	S1?
CELITHEMIS MONOMELAENA	BLACK SPOTTED SKIMMER	**		G5Q	S1
CELITHEMIS VERNA	DOUBLE-RINGED PENNANT	**		G5	S1
CHROMAGRION CONDITUM	AURORA DAMSEL	**		G5	S2S3
CORDULEGASTER BILINEATA	BROWN SPIKETAIL	**		G5	S1
CORDULEGASTER DIASTATOPS	DELTA-SPOTTED SPIKETAIL	**		G5	S1
CORDULEGASTER ERRONEA	TIGER SPIKETAIL	**		G4	S1
CORDULEGASTER MACULATA	TWIN-SPOTTED SPIKETAIL	**		G5	S2S3
CORDULEGASTER OBLIQUA DOROCORDULIA	ARROWHEAD SPIKETAIL	**		G4	S2S3

LIBERA	RACKET-TAILED EMERALD	**		G5	SH
ENALLAGMA BOREALE	BOREAL BLUET	**		G5	S1S2
ENALLAGMA CYATHIGERUM	NORTHERN BLUET	**		G5	S1S2
ENALLAGMA DIVAGANS	TURQUOISE BLUET	**		G5	S2?
ERPETOGOMPHUS DESIGNATUS	EASTERN RINGTAIL	**		G5	S2
GOMPHUS CRASSUS	HANDSOME CLUBTAIL	**		G3G4	S2
GOMPHUS LINEATIFRONS	SPLENDID CLUBTAIL	**		G4	S2S3
GOMPHUS QUADRICOLOR	RAPIDS CLUBTAIL	**		G3G4	S2
GOMPHUS SPICATUS	DUSKY CLUBTAIL	**		G5	S2
GOMPHUS VENTRICOSUS	SKILLET CLUBTAIL	**		G3	S1S2
GOMPHUS VIRIDIFRONS	GREEN-FACED CLUBTAIL	**		G3	S1
HAGENIUS BREVISTYLUS	DRAGONHUNTER	**		G5	S2S3
HETAERINA TITIA	SMOKY RUBYSPOT	**		G5	S2S3
ISCHNURA KELLICOTTI	LILYPAD FORKTAIL	**		G5	S2?
ISCHNURA PROGNATA	FURTIVE FORKTAIL	**		G4	S1?
LEUCORRHINIA FRIGIDA	FROSTED WHITEFACE	**		G5	S2S3
MACROMIA GEORGINA	GEORGIA RIVER CRUISER	**		G5	S2S3
MACROMIA PACIFICA	GILDED RIVER CRUISER	**		G4	S1
MACROMIA WABASHENSIS	WABASH BELTED SKIMMER DRAGONFLY	**		G1G3Q	S1
NANNOTHEMIS BELLA	DWARF SKIMMER	**		G4	S1S2
NEHALENNIA GRACILIS	SPHAGNUM SPRITE	**		G5	S1
NEUROCORDULIA OBSOLETA	UMBER SHADOWFLY	**		G4	S1
NEUROCORDULIA YAMASKANENSIS	STYGIAN SHADOWFLY	**		G5	S1
OPHIOGOMPHUS RUPINSULENSIS	RUSTY SNAKETAIL	**		G5	S2S3
SOMATOCHLORA ENSIGERA	LEMON-FACED EMERALD	**		G4	S1
SOMATOCHLORA HINEANA	OHIO EMERALD DRAGONFLY	LE	SX	G2	SX
SOMATOCHLORA LINEARIS	MOCHA EMERALD	**		G5	S2S3
SOMATOCHLORA TENEBROSA	CLAMP-TIPPED EMERALD	**		G5	S2S3
STYLURUS AMNICOLA	RIVERINE CLUBTAIL	**		G3G4	S1S2
STYLURUS LAURAE	LAURA'S CLUBTAIL	**		G3G4	S1S2
STYLURUS NOTATUS	ELUSIVE CLUBTAIL DRAGONFLY	**		G3G4	S1
SYMPETRUM DANAE	BLACK MEADOWFLY	**		G5	S2
SYMPETRUM SEMICINCTUM	BAND-WINGED MEADOWFLY	**		G5	S2S3
TACHOPTERYX THOREYI	GRAY PETALTAIL	**		G4	S2S3
TETRAGONEURIA SPINIGERA	SPINY BASKETTAIL	**		G5	S1

Butterflies, Skippers, Moths

AMBLYSCIRTES AESCULAPIUS	BELL'S ROADSIDE SKIPPER	**		G4	S1
AMBLYSCIRTES BELLI	SALT-AND-PEPPER SKIPPER	**		G4	S1S2
AMBLYSCIRTES HEGON	VEINED WHITE	**	WL	G5	S1S3
ARTOGEIA NAPI OLERACEA	WEST VIRGINIA WHITE	**	SE	G5T4	S1
ARTOGEIA VIRGINIENSIS	DUSTED SKIPPER	**	SR	G4	S3
ATRYTONOPSIS HIANNA	GOLDEN-BANDED SKIPPER	**	ST	G4G5	S2S3
AUTOCHTON CELLUS	NOCTUID MOTH	**	WL	G4	S1S2
BELLURA DENSA	MYRINA SILVER-BORDERED	**		G5	S?
BOLORIA SELENE	FRITILLARY				
	NORTHERN METALMARK	**		G5T5	S2S3
CALEPHELIS BOREALIS	SWAMP METALMARK	**	SR	G3G4	S3
CALEPHELIS MUTICA	RED-BANDED HAIRSTREAK	**		G4	S2S3
CALYCOPIS CECROPS	MARBLED UNDERWING	**		G5	S2S3
	MOTH				
CATOCALA DULCIOLA	SOOTY AZURE	**		G3	S?
CATOCALA MARMORATA	APPALACHIAN BLUE	**	WL	G4	S1
CELASTRINA EBENINA	HARRIS' CHECKERSPOT	**	SR	G4	S2
CELASTRINA NEGLECTA MAJOR	GEMMED SATYR	**	SR	G4	S1S2
CHLOSYNE HARRISII	CREOLE PEARLY EYE	**	SX	G4	S2
CYLLOPSIS GEMMA	PINKPATCHED LOOPER	**	ST	G5	S2
	MOTH				
ENODIA CREOLA	COLUMBINE DUSKYWING	**		G4?	SU
EOSPHOROPTERYX THYATYROIDES	MOTTLED DUSKYWING	**		G4G5	S2
ERYNNIS LUCILIUS	PERSIUS DUSKYWING	**	ST	G4	S1?
ERYNNIS MARTIALIS	OLYMPIA MARBLEWING	**	SE	G4	S3
ERYNNIS PERSIUS PERSIUS	BALTIMORE	**	ST	G4T2T3	S1S2
EUCHLOE OLYMPIA	TWO-SPOTTED SKIPPER	**		G4	S2
EUPHYDRYAS PHAETON	SCARCE SWAMP SKIPPER	**	SR	G4	S2S4
EUPHYES BIMACULA	NORTHERN HAIRSTREAK	**	SR	G4	S2
EUPHYES DUKESI	SILVERY BLUE	**	WL	G3	S2
EURISTRYMON ONTARIO	MIDWESTERN FEN	**	SE	G4	S2S4
GLAUCOPSYCHE LYGDAMUS COUPERI	BUCKMOTH	**		G5T4	S1
HEMILEUCA SP 3	CAROLINA SATYR	**		G3G4	S1?
	SKIPPER				
HERMEUPTYCHIA SOSYBIUS HESPERIA	COBWEB SKIPPER	**	SR	G5Q	S1S2
LEONARDUS LEONARDUS	OTTOE SKIPPER	**	ST	G4	S2
HESPERIA METEA	INDIAN SKIPPER	**	SE	G4G5	S2S3
HESPERIA OTTOE	A PROMINENT MOTH	**	SR	G3?	S1
HESPERIA SASSACUS	HENRY'S ELFIN	**	ST	G5	S3
HYPERAESCHRA TORTUOSA	FROSTED ELFIN	**		G?	S2
INCISALIA HENRICI TURNERI	HOARY ELFIN	**	SR	G5T4T5	S2S4
INCISALIA IRUS	KARNER BLUE BUTTERFLY	**	SR	G4	S2
INCISALIA POLIA	DORCAS COPPER	**	SE	G5	S1?
LYCAEIDES MELISSA SAMUELIS	BOG COPPER	LE		G5T2	S1
LYCAENA DORCAS DORCAS	PURPLISH COPPER	**	SX	G4TU	S2
LYCAENA EPIXANTHE	GREAT COPPER	**		G4G5	SX
LYCAENA HELLOIDES	A LYTROSIS MOTH	**	WL	G5	S2S4
LYCAENA XANTHOIDES	BARRENS METARRANTHIS	**	ST	G5	S?

LYTROSIS PERMAGNARIA	OLIVE HAIRSTREAK	**	WL		
METARRANTHIS APICIARIA	MITCHELL'S SATYR	**		GU	SH
	POWESHIEK SKIPPER	**			
MITOURA GRYNEA GRYNEA	RATTLESNAKE-MASTER	LE	SE	G5T5	S2S4
NEONYMPHA MITCHELLII MITCHELLII	BORER MOTH	**	SX	G2T2	S1
OARISMA POWESHEIK	COLUMBINE BORER	**		G2G3	SH
PAPAIPEMA ERYNGII	WHITE M HAIRSTREAK	**	SX	G1	SX
	VIATOR BROAD-WINGED	**	WL	G4	S?
PAPAIPEMA LEUCOSTIGMA	SKIPPER	**		G5	S1S3
PARRHASIUS M-ALBUM	GRAY COMMA	**	SR	G5T4	S2
POANES VIATOR	BUNCHGRASS SKIPPER	**	SR	G5	S2S4
	ANNOINTED SALLOW MOTH	**	SR	G3G4	S2
POLYGONIA PROGNE	APPALACHIAN EYED	**	SE	GU	S2
PROBLEMA BYSSUS	BROWN			G5T5	S1
PYREFERRA CEROMATICA SATYRODES	SMOKEY-EYED BROWN	**		G5T3T4	S1S2
APPALACHIA APPALACHIA	GLORIUS FLOWER MOTH	**	WL	G4	SU
SATYRODES EURYDICE FUMOSA	INDIANA PHLOX MOTH	**	SE	GU	S1
SCHINIA GLORIOSA SCHINIA	ATLANTIS FRITILLARY	**		G5	S1?
SPEYERIA ATLANTIS SPEYERIA	REGAL FRITILLARY	**		G3	SX
DIANA DIANA	CONFUSIS EASTERN	**	SE	G3	S1
SPEYERIA IDALIA THORYBES	CLOUDYWING	**		G4	S1?

Mayflies

ANEPEORUS SIMPLEX	FLAT-HEADED MAYFLY	**	SE	G3G5	S1
EPEORUS NAMATUS	A MAYFLY	**	SE	G?	S1
EPHEMERELLA ARGO ARGO	EPHEMERELLAN MAYFLY	**	SE	G1G3	S?
HOMOEONEURIA AMMOPHILA	A SAND-FILTERING MAYFLY	**	SE	G4G5	S1
PARACLOEODES MINUTUS	A SMALL MINNOR MAYFLY	**	SR	G?	S2
PENTAGENIA ROBUSTA	ROBUST PENTAGENIA BURROWING MAYFLY	**	SX	GH	SX
PENTAGENIA VITTIGERA	PENTAGENIAN BURROWING MAYFLY	**	ST	G4G5	S2
PSEUDIRON CENTRALIS	A MAYFLY	**	SE	G?	S1
RAPTOHEPTAGENIA CRUENTATA	FLATHEADED MAYFLY	**	SE	G?	S1
SIPHLOPLECTON BASALE	SAND MINNOW MAYFLY	**	SE	G?	S2
SIPHLOPLECTON INTERLINEATUM	SAND MINNOW MAYFLY	**		G?	S1
SPINADIS WALLACEI	WALLACE'S DEEPWATER MAYFLY	**	SE	G?	S?
TORTOPUS PRIMUS	A MAYFLY	**	ST	G?	S2

WS WDM activities at airports in Indiana would not adversely affect any Federal or State listed T&E species, including those listed above. This determination is based on the conclusions made by the FWS during their 1992 programmatic consultation of WS activities and subsequent Biological Opinion. The FWS determined that the management activities being utilized for WS

WDM at airports in Indiana are not likely to adversely affect those species listed in the 1992 Biological Opinion (USDA 1997). Furthermore, WS has conducted an informal section 7 with the USFWS and IDNR, who both concur with WS findings (USFWS letter, Hudak 1996).

The 1992 Biological Opinion (B.O.) from the USFWS concluded that the interior least tern, and piping plover would not be adversely affected by any aspect of the WS program which included all methods of WDM described herein (USDA 1997, Appendix F).

DRC-1339 poses no primary hazard to eagles because eagles do not eat grain or other bait materials on which this chemical might be applied during WDM, and, further, because eagles are highly resistant to DRC-1339. Up to 100 mg doses were force fed to captive golden eagles with no mortality or adverse effects noted other than regurgitation and head-shaking (Larsen and Dietrich 1970). Secondary hazards to raptors from DRC-1339 and Avitrol are low to nonexistent (see Appendix B). Therefore, WS WDM at airports in Indiana will have no adverse effects on bald eagles.

Mitigation measures to avoid non-target and T&E species impacts are described in Chapter 3 (section 3.4.2.2). The inherent safety features of DRC-1339 use that preclude or minimize hazards to mammals and plants are described in Appendix B and in a formal risk assessment in the ADC FEIS (USDA 1997, Appendix P). Those measures and characteristics should assure there would be no jeopardy to T&E species or adverse impacts on mammalian or non-T&E bird scavengers from the proposed action.

4.1.2.2 Alternative 2 – Non-lethal WDM only, by WS

Under this alternative, WS take of non-target animals would probably be less than that of the proposed action because WS would take no lethal control actions. However, non-target take would not differ substantially from the current program because the current program has taken no non-target animals. On the other hand, airports whose wildlife damage problems were not effectively resolved by non-lethal control methods and recommendations would likely resort to other means of lethal control such as use of shooting by airport personnel/contractors. This could result in less experienced persons implementing control methods and could lead to greater take of non-target wildlife than the proposed action. For example, shooting by persons not proficient at bird identification could lead to killing of non-target birds.

4.1.2.3 Alternative 3 Lethal WDM only, by WS

Under this alternative, only lethal WDM activities would be recommended and implemented to resolve wildlife conflicts in all situations. WS would not recommended or use any non-lethal WDM activities to reduce wildlife damage at airports in Indiana. WS take of non-targets would not differ substantially from the current program described in section 4.1.2.1. Because fewer WDM control methods would be available for use by WS, it would be more difficult to reduce wildlife conflicts to an acceptable level. This could lead to non-WS personnel to implement their own less selective WDM activities. Technical support would lead to more appropriate use of lethal control methods by non-WS personnel such as those under Alternative 2. Airport personnel/contractor efforts to reduce or prevent damage could still result in less experienced persons implementing control methods that could lead to greater take of non-target wildlife than under the proposed action.

4.1.2.4 Alternative 4 - No Federal WS WDM

Alternative 4 would not allow any WS WDM at airports in Indiana. There would be no impact on non-target or T&E species by WS WDM activities from this alternative. However, airport personnel/contractor efforts to reduce or prevent conflicts could increase, which could result in less experienced persons implementing control methods that could lead to greater take of non-target wildlife than under the proposed action. For example, shooting by persons not proficient at bird identification could lead to killing of non-target birds.

4.1.3 Economic Losses to Property as a Result of Wildlife Damage

4.1.3.1 Alternative 1- Implement a Federal Wildlife Damage Management Program (Proposed Action/No Action)

Many airports are concerned with the economic cost associated with damage caused by wildlife to aircraft and other airport property. Wildlife can cause severe damage or total loss to aircraft, structural damage to aircraft hangers and buildings, damage to equipment and other property, obstruction and damage to water control structures, and damage to the perimeter security fencing. Integrated WDM, a combination of lethal and non-lethal means, has the greatest potential of successfully reducing the risk of wildlife damage. All WDM methods could possibly be implemented and recommended by WS.

Alternative 2 – Non-lethal WDM only, by WS

Under this alternative, WS would be restricted to implement and recommend only non-lethal methods to provide assistance for wildlife damage. Wildlife damage could increase under this alternative if non-lethal techniques were ineffective. Airport operations personnel requesting WDM assistance to reduce wildlife damage would not be provided information or services in lethal control. If non-lethal methods did not reduce or eliminate the wildlife damage, no WS options would be available. Airport personnel/contractors would then be required to develop and implement their own lethal program. These programs would have a potential for limited success, depending upon the expertise of the personnel involved. Therefore, wildlife damage to property could remain the same or greater than the proposed action.

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Alternative 3 - Lethal WDM only, by WS

Under this alternative, only lethal WDM activities would be implemented or recommended to resolve wildlife damage to property in all situations. Toxicants, drugs, lethal trapping, and shooting would be available for use, however, due to safety considerations and airport regulations all lethal WDM methods may not be available for use in all situations. In areas where lethal WDM could not be conducted, such as areas on an airfield where discharge of firearms is not safe or allowed, wildlife damage would not be reduced. In these situations, WS would not be able to recommend or use non-lethal methods that would otherwise be available under the proposed action. If airport personnel/contractor did not implement their own non-lethal program in this particular situation, the likely result would be persistent or increased wildlife damage to property. Therefore, wildlife damage to property could remain the same or greater than the proposed action.

Alternative 4 - No Federal WS WDM

With no WS assistance, airport personnel/contractor would be responsible for developing and

implementing their own WDM program. Negative impacts on wildlife damage to property could be greater under this alternative than the proposed action. . Airport efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods, therefore leading to a greater potential for wildlife property damage to continue, than under the proposed action.

4.1.4 Effects on Human Health and Safety

4.1.4.1 Impacts of chemical WDM methods on human health

Alternative 1 – Implement a Federal Wildlife Damage Management Program (Proposed Action/No Action)

DRC-1339 (3-chloro-p-toluidine hydrochloride). DRC-1339 is the primary lethal chemical method that would be used under the current program alternative for lethal bird control. There has been some concern expressed by a few members of the public that unknown but significant risks to human health may exist from DRC-1339 used for WDM.

This chemical is one of the most extensively researched and evaluated pesticides ever developed. Over 30 years of studies have demonstrated the safety and efficacy of this compound. Appendix B provides more detailed information on this chemical and its use in BDM. Factors that virtually eliminate any risk of public health problems from use of this chemical are:

- Its use is prohibited within 50 feet of standing water and cannot be applied directly to food or feed crops (contrary to some misconceptions expressed by a few members of the public, DRC-1339 is not applied to feed materials that livestock can feed upon).
- DRC-1339 is highly unstable and degrades rapidly when exposed to sunlight, heat, or ultraviolet radiation. The half-life is about 25 hours, which means that treated bait material generally is nearly 100% broken down within a week.
- It is more than 90% metabolized in target birds within the first few hours after they consume the bait. Therefore, little material is left in bird carcasses that may be found or retrieved by people.
- Application rates are extremely low (less than 0.1 lb. of active ingredient per acre) (EPA 1995).
- A human would need to ingest the internal organs of birds found dead from DRC-1339 to have any chance of receiving even a minute amount of the chemical or its metabolites into his/her system. This is highly unlikely to occur.
- The EPA has concluded that, based on mutagenicity (the tendency to cause gene mutations in cells) studies, this chemical is not a mutagen or a carcinogen (i.e., cancer-causing agent) (EPA 1995). Regardless, however, the extremely controlled and limited circumstances in which DRC-1339 is used would prevent any exposure of the public to this chemical.

The above analysis indicates that human health risks from DRC-1339 use would be virtually nonexistent under any alternative.

Avitrol (4-Aminopyridine). Avitrol is another chemical method that might be used by WS for bird control. Although this chemical was not identified as being one of concern for human health effects, analysis of the potential for adverse effects is presented here. Appendix B provides more detailed information on this chemical.

Avitrol is available as a prepared grain bait mixture that is mixed in with clean bait at no greater than a 1:9 treated to untreated mixture. In addition to this factor, other factors that virtually eliminate health risks to members of the public from use of this product as an avicide are:

- It is readily broken down or metabolized into removable compounds that are excreted in urine in the target species (ETOXNET 1996). Therefore, little of the chemical remains in killed birds to present a hazard to humans.

- A human would need to ingest the internal organs of birds found dead from Avitrol ingestion to have any chance of receiving even a minute amount of the chemical or its metabolites into his/her system. This is highly unlikely to occur. Furthermore, secondary hazard studies with mammals and birds have shown that there is virtually no hazard of secondary poisoning.

- Although Avitrol has not been specifically tested as a cancer-causing agent, the chemical was found not to be mutagenic in bacterial organisms (EPA 1997). Therefore, the best scientific information available indicates it is not a carcinogen. Regardless, however, the extremely controlled and limited circumstances in which Avitrol is used would prevent exposure of members of the public to this chemical.

The above analysis indicates that human health risks from Avitrol use would be virtually nonexistent under any alternative.

Rodenticides. Several anticoagulant rodenticides are used to control commensal rodents and some field rodents around building and other structures. Common anticoagulants include warfarin and diphacinone. Anticoagulants are normally classified s multiple-dose toxicants. For the materials to be effective, animals must feed on the bait more than once. However, some newer formulations only require a single feeding to e effective. Bair for rats and mice must be continuously available for 2 to 3 weeks for effective population control.

Zinc phosphide is a metallic toxicant most often used for rat, vole, muskrat, and nutria damage control. The odor of zinc phosphide is attractive to rodents by repulsive to most other animals. Tarter emetic is sometimes added to baits used to control rats. This safety feature will cause most other species to regurgitate any zinc phosphide baits they may consume. Its effectiveness for rat control is not compromised because rats are unable to regurgitate.

Other WDM Chemicals. Other non-lethal WDM chemicals that might be used or recommended by WS include repellents such as methyl anthranilate (artificial grape flavoring used in foods and soft drinks sold for human consumption), Flight Control, which is used as an area repellent, and the tranquilizer drug Alpha-chloralose. Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before EPA or FDA would register them. Any operational uses of chemical repellents would be in accordance with labeling requirements under FIFRA and state pesticide laws and regulations that are established to avoid unreasonable adverse effects on the environment.

Following labeling requirements and use restrictions are a built-in mitigation measure that would assure that use of registered chemical products would avoid adverse effects on human health. Based on a thorough Risk Assessment, APHIS concluded that, when WS program chemical methods are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997).

Alternative 2 – Non-lethal WDM only, by WS

Alternative 2 would not allow for any lethal methods use by WS at airports in Indiana. WS could only implement non-lethal methods such as harassment and exclusion devices and materials. Non-lethal methods could, however, include the tranquilizer drug Alpha-chloralose and chemical repellents such as methyl anthranilate. Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before EPA or FDA registers them. Any operational use of chemical repellents would be in accordance with labeling requirements under FIFRA and state pesticide laws and regulations and FDA rules, which are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are a built-in mitigation measure that would assure that use of registered chemical products would avoid adverse effects on human health.

Alternative 3 - - Lethal WDM only, by WS

Under this alternative, only lethal WDM activities would be implemented to resolve wildlife damage in all situations. WS would not recommended or use any non-lethal WDM activities to reduce bird and mammal damage at airports in Indiana. WS's use of chemical WDM methods would not differ substantially from the proposed action.

Alternative 4 - No Federal WS Wildlife Damage Management

Alternative 4 would not allow any WS WDM at airports in Indiana. Concerns about human health risks from WS's use of chemical WDM methods would be alleviated because no such use would occur. DRC-1339 and Alpha-Chloralose are only registered for use by WS personnel, and would not be available for use by airport personnel or government contractors. The immobilizing and euthanizing chemicals are only available for use by certified WS personnel or a licensed veterenarian. Commercial pest control services would be able to use Avitrol and such use would likely occur to a greater extent in the absence of WS's assistance. However, use of Avitrol in accordance with label requirements should avoid any hazard to members of the public.

4.1.4.2 Impacts on human safety of non-chemical WDM methods

Alternative 1 – Implement a Federal Wildlife Damage Management Program (Proposed Action/No Action)

Non-chemical WDM methods that might raise safety concerns include shooting with firearms, use of traps and snares, and harassment with pyrotechnics. Firearms are only used by WS personnel who are experienced in handling and using them. WS traps are strategically placed to minimize exposure to humans and pets. Body-grip (i.e. Conibear) traps for beaver and muskrats are restricted to water sets, which further reduces threats to public and pet health and safety. WS personnel receive safety training on a periodic basis to keep them aware of safety concerns. The IN WS program has had no accidents involving the use of firearms, traps, or pyrotechnics in which a

member of the armed forces or the public were harmed. A formal risk assessment of WS's operational management methods found that risks to human safety were low (USDA 1997, Appendix P). Therefore, no adverse impacts on human safety from WS's use of these methods are expected.

Alternative 2- Non-lethal by WDM only, by WS

Under this alternative, WS would not use firearms for lethal control during WDM but would still be able to use them as a harassment method. WS would also use pyrotechnics. Risks to human safety from WS's use of firearms, lethal control and pyrotechnics hypothetically would be similar to the current program alternative. IN WS's current WDM program has an excellent safety record of no accidents involving these devices have occurred resulting in a member of the armed forces or public being harmed. Increased use of these devices by less experienced and trained individuals would probably occur under this alternative. Impacts from this alternative could be greater or about the same as the proposed action.

Alternative 3 – Lethal WDM only, by WS

Under this alternative, only lethal WDM activities would be implemented to resolve wildlife damage in all situations. WS would not recommended or use any non-lethal WDM activities to reduce wildlife damage at airports in Indiana. WS's use of non-chemical lethal WDM methods, the use of firearms, and body-gripping traps, would not differ substantially from the program described in Alternative 1. Although technical support, might lead to more selective use of lethal control methods by airport personnel than that which might occur under Alternative 2, airport efforts to reduce or prevent conflicts could still result in less experienced persons implementing control methods.

Alternative 4 - - No Federal WS Wildlife Damage Management

Under this alternative, WS would not engage in or recommend use of any non-chemical WDM methods. Risks to human safety from WS's use of firearms, traps, snares, and pyrotechnics would hypothetically be lower than the current program alternative. However, increased use of firearms, traps, snares, and pyrotechnics by less experienced and trained private individuals would probably occur without WS assistance. Risks to human safety under this alternative could increase or remain about the same as the proposed action.

4.1.4.3 Impacts on human safety from Wildlife strike hazards to aircraft

Alternative 1 - - Implement a Federal Wildlife Damage Management Program (Proposed Action/No Action)

Airport personnel are concerned with potential injury and loss of human life as a result of wildlife/aircraft collisions. An Integrated WDM strategy, a combination of lethal and non-lethal means, has the greatest potential of successfully reducing the risk of wildlife aircraft strikes. All WDM methods could possibly be implemented and recommended by WS.

Alternative 2 – Non-lethal WDM only, by WS

Under this alternative, WS would be restricted to implement and recommend only non-lethal methods to provide assistance for wildlife damage. Wildlife strikes could increase under this

alternative if non-lethal techniques were ineffective. Airport personnel requesting WDM assistance to reduce wildlife strikes would not be provided information or services in lethal control. If non-lethal methods did not reduce or eliminate the wildlife hazard, no WS options would be available. Airport personnel would then be required to implement their own lethal program with success, dependent upon the expertise of the personnel involved. Therefore wildlife strike hazards could be greater or remain the same as the proposed action.

Alternative 3 - Lethal WDM only, by WS

Under this alternative, only lethal WDM activities would be implemented or recommended to resolve wildlife strike hazards in all situations. However, due to safety considerations and airport regulations all lethal WDM methods would not be available for use in all situations. In areas where lethal WDM could not be conducted, such as areas on the airfield where discharge of firearms is not safe or allowed, wildlife strikes would not be reduced. In these situations WS would not be able to recommend or use non-lethal methods that otherwise would be available under the proposed action. If airport personnel did not implement their own non-lethal program in this particular situation, the likely results would be the number of wildlife strikes remaining the same or increasing. Therefore, impacts on human safety could be greater under this alternative than the proposed action.

Alternative 4 - No Federal WS WDM

With no WS assistance, airport personnel would be responsible for developing and implementing their own WDM program. Airport efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods, therefore leading to a greater potential of not reducing wildlife strikes, than under the proposed action.

4.1.5 Effects on Aesthetics

4.1.5.1 Effects on Human Affectionate-Bonds with Individual Animals and on Aesthetic Values of Wildlife Species

Alternative 1 - - Implement a Federal Wildlife Damage Management Program (Proposed Action/No Action)

Some people who routinely view or feed individual birds and mammals such as geese and deer would likely be disturbed by removal of such animals under the current program. Some people have expressed opposition to the killing of any animal during WDM activities. Under the current program, some lethal control of wildlife would continue and these persons would continue to be opposed. However, many persons who voice opposition has no direct connection or opportunity to view or enjoy the particular animals that would be killed by WS's lethal control activities. Lethal control actions would generally be restricted to local sites and to small, insubstantial percentages of overall populations. Therefore, the species subjected to limited lethal control actions would remain common and abundant and would therefore continue to remain available for viewing by persons with that interest.

Some people do not believe that wildlife or bird roosts should even be harassed to stop or reduce damage problems. Some people who enjoy viewing wildlife would feel their interests are harmed by WS's non-lethal harassment program. Mitigating that impact, however, is the fact that a harassment program does not diminish overall numbers of wild animals in the area. People who like to view these species can still do so on State wildlife management areas, as well as numerous private property sites where the owners are

not experiencing damage from wild birds mammals and are tolerant of their presence.

Alternative 2 – Non-lethal WDM only, by WS

Under this alternative, WS would not conduct any lethal WDM but would still conduct harassment of wildlife that was causing damage. Some people who oppose lethal control of wildlife by government but are tolerant of government involvement in non-lethal wildlife damage management would favor this alternative.

Some people do not believe that wildlife or bird roosts should even be harassed to stop or reduce damage problems. Some people who enjoy viewing wildlife would feel their interests are harmed by WS's non-lethal harassment program. Mitigating that impact, however, is the fact that a harassment program does not diminish overall numbers of wild animals in the area. People who like to view these species can still do so on State wildlife management areas, as well as numerous private property sites where the owners are not experiencing damage from wild birds and mammals and are tolerant of their presence.

Persons who have developed affectionate bonds with individual wild birds and mammals would not be affected by WS's lethal WDM activities under this alternative because WS would not kill the individual animal(s). However, airport personnel would likely conduct lethal WDM activities that would no longer be conducted by WS. Therefore the impacts of this alternative would be similar to the proposed action.

Alternative 3 - Lethal WDM only, by WS

Under this alternative, only lethal WDM activities would be implemented or recommended. People that have expressed opposition to the killing of any bird or mammal during WDM activities would likely be opposed to this alternative. Non-lethal methods would not be used or recommended by WS, therefore impacts of this alternative would be greater than the propose action.

Alternative 4 - No Federal WS WDM

Under this alternative, WS would not conduct any lethal or non-lethal WDM activities. Some people who oppose any government involvement in wildlife damage management would favor this alternative. Persons who have developed affectionate bonds with individual wild birds and mammals would not be affected by WS's activities under this alternative. However, airport personnel/contractors would likely conduct similar WDM activities as those that would no longer be conducted by WS, resulting in impacts similar to the current program alternative.

4.1.5.2 Effects on Aesthetic Values of Property Damaged by Wildlife

Alternative 1 - - Implement a Federal Wildlife Damage Management Program (Proposed Action/No Action)

Under this alternative, WS would provide operational and technical assistance in reducing bird problems in which droppings are causing an unsightly mess and would, if successful, improve aesthetic values of affected properties in the view of the airport. All WDM methods would be available for use, including the use of DRC-1339 and Alpha-chloralose. Relocation of nuisance roosting birds by harassment can sometimes result in the birds causing the same or similar problems at the new location. If WS is providing direct operational assistance in relocating such birds, coordination with local authorities to

monitor the birds' movements is generally conducted to assure they do not reestablish in other undesirable locations.

WS would provide operational and technical assistance in reducing nuisance mammal damage such as undermining drainage structures and damaging landscaping and other vegetation, which would also improve the view of the airport. All WDM methods would be available for use, including the use of selective rodenticides and repellents. Relocation of nuisance mammals can sometimes result in the animals causing the same or similar problems at the new location. If WS is providing direct operational assistance in managing nuisance mammals, coordination with State authorities ensures compliance with State wildlife management goals and regulations.

Alternative 2 – Non-lethal WDM only, by WS

Under this alternative, WS would only provide non-lethal operational and technical assistance to reduce problems in which droppings from birds have caused an unsightly mess and would, if successful, improve aesthetic values of affected properties in the view of the airport. Relocation of nuisance roosting birds by harassment can sometimes result in the birds causing the same or similar problems at the new location. If WS is providing direct operational assistance in relocating such birds, coordination with local authorities to monitor the birds' movements are generally conducted to assure they do not reestablish in other undesirable locations.

Relocation of nuisance mammals can sometimes result in the animals causing the same or similar problems at the new location. If WS is providing direct operational assistance in managing nuisance mammals, coordination with State authorities ensures compliance with State wildlife management goals and regulations.

If non-lethal WDM methods were not effective in reducing wildlife problems, WS would not be able to recommend or implement any potential successful lethal WDM method. Airport personnel would then have the option of doing nothing, which would not reduce the problem, or implement their own control methods, which can have varying success. Overall, impacts of improving aesthetics would be slightly less than the proposed action.

Alternative 3 -. Lethal WDM only, by WS

Under this alternative, only lethal WDM activities would be implemented or recommended. This alternative would result in nuisance wildlife being removed by lethal means only. Where lethal WDM could be conducted, wildlife damage would likely be reduced to acceptable levels. In areas where lethal WDM could not be conducted, such as areas on the airfield where discharge of firearms is not safe or allowed, wildlife damage would not be reduced. Each airport would be required to develop and implement their own non-lethal WDM programs. Relocation of nuisance wildlife or bird roosts through harassment, barriers, or habitat alteration can sometimes result in causing the same problems at the new location. If WS does not provided non-lethal assistance to airport personnel, coordination with local authorities to monitor bird and wildlife movements to assure they do not reestablish in other undesirable locations might not be conducted. Thus, this alternative could likely result in more property owners experiencing adverse effects on the aesthetic values of their properties than the current program alternative.

Alternative 4 - No Federal WS WDM

Under this alternative, WS would not provide any operational or technical assistance in reducing wildlife

problems. Aesthetic values of the airport(s) in Indiana would continue to be adversely affected, if airport personnel were not able to implement there own WDM, or reduce damage in some other way. In many cases, this type of aesthetic "damage" would increase as a resulting of airport personnel not being able to resolve their problems. Wildlife numbers would continue to increase, resulting in a greater chance of adverse impacts than with the proposed action.

4.1.6 Humaneness and Animal Welfare Concerns of Lethal Methods Used by WS

Alternative 1 – Implement a Federal Wildlife Damage Management Program (Proposed Action/No Action)

Under this alternative, methods viewed by some persons as inhumane would continue to be used in WDM by WS. Some people would view methods employed to capture and/or kill hazardous wildlife for airport safety purposes and the protection of property as inhumane. Humaneness, as it relates to the killing or capturing of wildlife is an important but complex concept that can be interpreted in a variety of ways. Humaneness is a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. However, humaneness as it relates to the natural world through natural mortality versus man-induced mortality must be brought into perspective. DeVos and Smith (1995) explain the characteristics of natural mortality in wildlife populations. There seems to be an increasing public perception that, left alone by humans, animal populations will experience few premature deaths and live to an old age without harm, pain or suffering. It should be recognized that wildlife populations reproduce at far greater rates than would be necessary to replace deaths if all lived to old age. To counterbalance this high reproduction, it is natural for most individuals of most species to die young, often before reaching breeding age. Natural mortality in wildlife populations includes predation, malnutrition, disease, inclement weather, and accidents. These "natural" deaths are often greater in frequency than human-caused deaths through regulated hunting, trapping, and wildlife damage management operations. From the standpoint of the animal, these natural mortality factors also may cause more suffering by wildlife, as perceived by humans, than human-induced mortality. Under given habitat conditions, most wildlife populations fluctuate around a rather specific density, sometimes called the carrying capacity. Populations that overshoot this density via reproduction become very sensitive to various sources of mortality, and death rates increase. Conversely, as populations drop, mortality rates decline (DeVos and Smith 1995). Thus, human-induced mortality - which often involves much less suffering of individual animals - invariably lessens mortality from other sources.

Research suggests that with some methods, such as restraint in leghold traps, changes in the blood chemistry of trapped animals indicate "stress." Blood measurements indicated similar changes in foxes that had been chased by dogs for about five minutes as those restrained in traps (USDA 1997j). However, such research has not yet progressed to the development of objective, quantitative measurements of pain or stress for use in evaluating humaneness. The challenge in coping with this issue is how to achieve the least amount of animal suffering with the constraints imposed by current technology. To insure the most professional handling of these issues and concerns, APHIS-WS has policies giving direction toward the achievement of the most humane program possible while still accomplishing the program's mission.

APHIS-WS has improved the selectivity of management devices through research and development of pan-tension devices and other device modifications such as breakaway snares. Research is continuing with the goal of bringing new findings and products into practical use. Until such time as new findings and products are found to be practical, some animal suffering will occur during lethal collection of animal specimens if monitoring and program effectiveness objectives are to be met. APHIS-WS has also improved the humaneness of current management devices through the incorporation of veterinary medical tranquilizers, immobilizers, and euthanizing agents.

WDM methods would include shooting, lethal trapping, snares and toxicants/chemicals such as immobilizing and euthanizing drugs, rodenticides, DRC-1339, and Avitrol. Shooting, when performed by experienced professionals, usually results in a quick death for target animals. Occasionally, however, some birds and mammals are initially wounded and must be shot a second time or must be caught by hand and then euthanized. Some persons would view shooting as inhumane. Despite SOP's designed to maximize humaneness, as described in sections 3.4.1, the perceived stress and trauma associated with being held in leghold traps or snares until the WS specialist arrives to euthanize the animal, is unacceptable to some persons. Other lethal WDM methods used to take target animals include body-gripping traps (i.e., snap traps and Conibears). These traps result in a relatively humane death because the animals die instantly or within seconds to a few minutes. The primary lethal bird chemical WDM method that would be used by WS under this alternative would be DRC-1339. This chemical causes a quiet and apparently painless death that results from uremic poisoning and congestion of major organs (Decino et al. 1966). The birds become listless and lethargic, and a quiet death normally occurs in 24 to 72 hours following ingestion. This method appears to result in a less stressful death than which probably occurs by most natural causes; which are primarily disease, starvation, and predation. For these reasons, WS considers DRC-1339 use under the current program to be a relatively humane method of lethal WDM. However, despite the apparent painlessness of the effects of this chemical, some persons will view any method that takes a number of hours to cause death as inhumane and unacceptable. The chemical Avitrol repels birds by poisoning a few members of a flock, causing them to become hyperactive (see discussion in Appendix B). Their distress calls generally alarm the other birds and cause them to leave the site. Only a small number of birds need to be affected to cause alarm in the rest of the flock. The affected birds generally die. Some persons would view Avitrol as inhumane treatment of the affected birds, based on the birds' distress behaviors. Occasionally, birds captured alive by traps, by hand or with nets would be euthanized. The most common method of euthanization would be cervical dislocation and by CO_2 gas which are AVMA-approved euthanasia methods (Beaver et al 2001). Most people would view AVMA-approved euthanization methods as humane.

The primary lethal small mammal chemicals WDM method that would be used by WS under this alternative would be rodenticides. Although it is difficult to develop objective quantitative measurements of pain or stress, rodents affected by these chemicals rarely display any evidence of pain. The rodents usually become listless and lethargic, and a quiet death normally occurs in 48 to 72 hours following ingestion. This method appears to result in a less stressful death than which probably occurs by most natural causes; which are primarily disease, starvation, and predation. For these reasons, WS considers rodenticide use under the current program to be a relatively humane method of lethal WDM. However, despite the apparent painlessness of the effects of these chemicals, some persons will view any method that takes a number of hours to cause death as inhumane and unacceptable. Occasionally, mammals captured alive by traps, by hand or with nets would be euthanized. The most common methods of euthanization for mid – larger size mammals would be gun shot or chemical injection, both of which are AVMA-approved euthanasia methods (Beaver et al 2001). Most people would view AVMA-approved euthanization methods as humane.

4.1.6.2 Alternative 2 – Non-lethal WDM only, by WS

Under this alternative, WS would not use lethal methods viewed as inhumane by some persons. However, airport personnel may reject non-lethal WDM recommended and provided by WS and would seek alternative lethal means resulting in impacts to humaneness similar to or greater than the proposed action. Impacts of lethal methods implemented by non-WS employees could be similar or greater than the proposed action depending upon their WDM training and experience. Since DRC-1339 would not be available to non-WS entities, the only chemical bird WDM method that could be legally used by these

entities would be Avitrol. Avitrol would most likely be viewed as less humane than DRC-1339 because of the distress behaviors that it causes. Unless the airport contracts for the services of a licensed veterinarian, the use of State and federally controlled capture/euthanasia chemicals would be illegal. Overall, people who perceive the use of lethal control methods by WS as inhumane would prefer this alternative to the proposed action.

4.1.6.3 Alternative 3 - Lethal WDM only, by WS

Under this alternative, only lethal WDM activities would be implemented or recommended. These methods would include shooting, trapping, snares, and the use of toxicants/chemicals that may be viewed by some persons as inhumane. Impacts for this alternative would be similar to the proposed action.

4.1.6.4 Alternative 4 - No Federal WS WDM

Under this alternative, lethal methods viewed as inhumane by some persons would not be used or recommended by WS. Similar to Alternative 2, DRC-1339 or other WS accessible chemicals would no longer be available for use. Thus, the only chemical bird WDM method legally available would be Avitrol which would be viewed by many persons as less humane than DRC-1339. Unless the airport contracts for the services of a licensed veterinarian, the use of State and federally controlled capture/euthanasia chemicals would be illegal. Shooting, and WDM trapping and capture methods could be used by non-WS entities and, similar to the current program alternative, would be viewed by some persons as inhumane. Overall, it is likely that WDM would be similar or somewhat less humane with this alternative than under the proposed action, dependent upon the training and expertise of the person implementing control methods.

4.2 Cumulative Impacts

No significant cumulative environmental impacts are expected from any of the 4 alternatives. Under the Proposed Action and Alternative 3, the lethal removal of wildlife would not have a significant impact on overall wild bird and mammal populations in Indiana, but some local reductions may occur. This is supported by the IDNR, which is the agency with responsibility for managing wildlife in the State (IDNR 2001). No risk to public safety is expected when WS' services are provided and accepted by requesting individuals in Alternatives 1,2, and 3, since only trained and experienced wildlife biologists would conduct and recommend WDM activities. There is a slight increased risk to public safety when persons who reject WS assistance and recommendations in Alternatives 1, 2 and 3 conduct WDM activities, and when no WS assistance is provided in Alternative 4. In all 4 Alternatives, however, it would not be to the point that the impacts would be significant. Although some persons will likely be opposed to WS' participation in WDM activities to protect property and human health and safety at airports in Indiana, the analysis in this EA indicates that WS Integrated WDM program will not result in significant cumulative adverse impacts on the quality of the human environment.

Table 4-1 Summarizes the expected impact of each of the alternatives on each of the issues.

Issues/Methods	**Alternative 1 – Implement a Federal Wildlife Damage Management Program (Proposed Action/No Action)**	**Alternative 2 – Non-lethal WDM Only, by WS**	**Alternative 3- Lethal WDM Only, by WS**	**Alternative 4 - No Federal WS WDM**
Effects on Target Wildlife Species Populations	Local populations in areas with damage or threat of damage would be reduce and sustained at a lower level. No effects on state populations.	Results may equal or be less than the proposed action.	Local populations in areas with damage or threat of damage would be reduced and sustained at a lower level. No effects on state populations	If airports in Indiana conduct their own management without WS, results could be similar or greater on population reduction. If not populations and threats would remain the same or increase.
Effects on other Wildlife Species Populations, including T&E Species	No probable effect.	No probable effect. If any airport chose to conduct lethal removal without WS, non-targets species maybe taken.	No probable effect.	If any airport conducts lethal WDM, non-target species may be taken.
Effects of Damage to Property from Wildlife Strikes	The proposed action has the greatest potential of successfully reducing this risk.	There is a greater potential of not reducing wildlife property damage than the proposed action.	There is a greater potential of not reducing wildlife property damage than the proposed action.	There is a greater potential of not reducing wildlife property damage than the proposed action.
Effects on Human Health and Safety	The proposed action has the greatest potential of successfully reducing this risk	Impacts on Human Safety could be greater under this alternative than the proposed action.	Impacts on Human Safety could be greater under this alternative than the proposed action.	Airport efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods, leading to a greater potential of not reducing wildlife strikes than under the proposed action.

Effects on Aesthetics	Variable. Airports who are receiving damage would favor this alternative. Some activists would oppose this alternative.	Variable. Activists would favor this alternative; however, airports in Indiana would probable impose their own lethal control, resulting in a larger take.	Since WS could not use non-lethal methods, the impacts of this alternative would be greater that the proposed action. Some activists would oppose this alternative.	Airport personnel would likely conduct similar WDM activities no longer conducted by WS, resulting in impacts similar to the current program alternative.
Humaneness and Animal Welfare Concerns of Lethal Methods Used by WS	Some people will view as inhumane. Others will view as more humane than alternative 3. Most people would view AVMA approved euthanization methods as humane.	People who perceive the use of lethal control methods by WS as inhumane would prefer this alternative to the proposed action.	Impacts for this alternative would be similar to the proposed action.	Airports would likely implement a similar WDM plan, and results would likely be similar or somewhat less humane with this alternative than under the proposed action.

Appendix A

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Appendix B

WILDLIFE DAMAGE MANAGEMENT (WDM) METHODS AVAILABLE FOR USE OR RECOMMENDATIONS BY THE INDIANA WILDLIFE SERVICES PROGRAM

NONLETHAL METHODS-NONCHEMICAL

Airfield management and property owner practices. These consist primarily of non-lethal preventive methods such as cultural methods and habitat modification. Airfield management or the property owner implements cultural methods and other management techniques. Resource owners/managers may be encouraged to use these methods, based on the level of risk, need, and professional judgment on their effectiveness and practically. These methods include:

Environmental/Habitat modification can be an integral part of WDM. Wildlife production and/or presence are directly related to the type, quality and quantity of suitable habitat. Therefore, habitat can be managed to reduce or eliminate the production or attraction of certain wildlife species. Airports in Indiana are responsible for implementing habitat modifications, and WS only provides advice on the type of modifications that have the best chance of achieving the desired effect. Habitat management is most often a primary component of WDM strategies at or near airports to reduce BASH problems by eliminating nesting, denning, roosting, loafing and feeding sites. Generally, many BASH problems on airport properties can be minimized through management of vegetation and water on areas adjacent to aircraft runways.

Animal Behavior Modification. This refers to tactics that alter the behavior of wildlife to reduce damage. Animal behavior modification may involve us of scare tactics or fencing to deter or repel animals that cause loss or damage (Twedt and Glahn 1982). Some but not all methods are included in this category are:

Wildlife fence (Physical Exclusion)
Bird-proof barriers
Propane cannons
Pryotechnics
Distress Calls and sound producing devices
Chemical frightening agents
Repellents
Harassment with a radio controlled plane
Mylar tape

These methods are generally only practical for small area. Scaring devices such as distress calls, propane cannons, raptor effigies and silhouettes, mirrors and moving disks can be effective but usually for only a short time before birds become accustomed and learn to ignore them (Schmidt and Johnson 1984, Bomford 1990, Rossbach 1975, Graves and Andelt 1987, Mott 1985, Shirota et al. 1983, Conover 1982, Arhart 1972).

Wildlife Fence (Physical Exclusion) – A fence around the airfield could limit the entry of mammals onto the runway and taxiways. There are several types of fences that inhibit the movement of mammals onto the airfield area if properly installed including electric fencing, woven wire, and chain link fencing.

Bird-proof barriers can be effective but often are cost-prohibitive, particularly because of the aerial mobility of, which requires overhead barriers as well as peripheral fencing or netting. Building, hangers and display planes could be “bird proofed” using hardware cloth or netting, where feasible, to eliminate roosting and nesting areas.

Porcupine wire (e.g., Nixalite™, Catclaw™) is a mechanical repellent method that can be used to exclude pigeons and other bird from ledges and other roosting surfaces (Williams and Coorigan 1994). The sharp points inflict temporary discomfort on the birds as they try to land, which deters them from roosting. Drawbacks of this method are that some pigeons have been know to build nests on top of porcupine wires and the method can be expensive to implement if large areas are involved. Electric shock bird control systems are available from commercial sources and, although expensive, can be effective in deterring pigeons and other birds from roosting on ledges, window sills and other similar portions of structures (Williams and Corrigan 1994).

Auditory scaring devices such as propane cannons, pyrotechnics, electronic guards, sirens, scarecrows, and audio distress/predator vocalizations are effective in many situations for dispersing damage-causing bird species. These devices are sometimes effective but usually only for a short period of time before birds become accustomed and learn to ignore them (Schmidt and Johnson 1984, Bomford 1990, Rossbach 1975, Mott 1985, Shirota et.al. 1983, and Arhart 1972). These methods should be reinforced with other scaring devices such as shooting and other types of physical harassment.

Visual techniques such as use of mylar tape (highly reflective surface produces flashes of light that startles birds), eye-spot balloons (the large eyes supposedly gives birds a visual cue that a large predator is present), flags, effigies (scarecrows), sometimes are effective in reducing bird damage. Mylar tape has produced mixed results in its effectiveness to frighten birds (Dolbeer et.al 1986, and Tobin et.al. 1998). Birds quickly learn to ignore visual and other scaring devices if the birds' fear of the methods is not reinforced with shooting or other tactics.

Physical harassment by radio controlled airplanes are effective in several situations for dispersing damage-causing birds. This tool is effective in removing raptors from areas that are not accessible by other means. Radio controlled airplanes allow for up close and personal harassment of birds, while combining visual (eyespots painted on the wings) and auditory (engine noise and whistles attached to the aircraft) scare devices. Disadvantages of method are birds in large flocks do not respond to well the plane, training is required to become efficient, a good working relationship is required by the operator and air traffic controllers, weather conditions may restrict the ability/usefulness of the plane, and mechanical up keep.

Relocation of damaging birds or mammals to other areas following live capture generally would not be effective nor cost-effective. Relocation to other areas following live capture would not generally be effective because problem bird species are highly mobile and can easily return to damage sites from long distances, habitats in other areas are generally already occupied, and relocation would most likely result in bird damage problems at the new location. Translocation of wildlife is also discouraged by WS policy (WS Directive 2.501) because of stress to the relocated animal, poor survival rates, and difficulties in adapting to new locations or habitats.

However, there are exceptions for the relocation of damaging birds or mammals that might be a viable solution and acceptable to the public when the birds or mammals were considered to have high value such as migratory waterfowl, raptors, or T&E species. In these cases, WS would consult with the USFWS and/or IDNR to coordinate capture, transportation, and selection of suitable relocation sites, as well as compliance with all proper guidelines.

Nest destruction is the removal of nesting materials during the construction phase of the nesting cycle. Nest destruction is generally only applied when dealing with a single bird or very few birds. This method is used to discourage birds from constructing nests in areas which may create nuisances for home and business owners. Heusmann and Bellville (1978) reported that nest removal was an effective but time-consuming method because problem bird species are highly mobile and can easily return to damage sites from long distances, or because of high populations. This method poses no imminent danger to pets or the public.

Egg addling/destruction is a method of suppressing reproduction in local nuisance bird populations by destroying egg embryos prior to hatching. Egg addling is conducted by vigorously shaking an egg numerous times which causes detachment of the embryo from the egg sac. Egg destruction can be accomplished in several different ways, but the most commonly used methods are manually gathering eggs and breaking them, or by oiling or spraying the eggs with a liquid which covers the entire egg and prevents the egg from obtaining oxygen (see *Egg oiling* below). Although WS does not commonly use egg addling or destruction, it is a valuable damage management tool and has shown to be effective.

Live traps include:

Clover, funnel, and common pigeon traps are enclosure traps made of nylon netting or hardware cloth and come in many different sizes and designs, depending on the species of birds being captured. The entrance of the traps also vary greatly from swinging-door, one-way door, funnel entrance, to tip-top sliding doors. Traps are baited with grains or other food material which attract the target birds. WS' standard procedure when conducting pigeon trapping operations is to ensure that an adequate supply of food and water is in the trap to sustain captured birds for several days. Active traps are checked daily, every other day, or as appropriate, to replenish bait and water and to remove captured birds.

Decoy traps are used by WS for preventive and corrective damage management. Decoy traps are similar in design to the Australian Crow Trap as reported by Johnson and Glahn (1994) and McCracken (1972). Live decoy birds of the same species that are being targeted are usually placed in the trap with sufficient food and water to assure their survival. Perches are configured in the trap to allow birds to roost above the ground and in a more natural position. Feeding behavior and calls of the decoy birds attract other birds which enter and become trapped themselves. Active decoy traps are monitored daily, every other day, or as appropriate, to remove and euthanize excess birds and to replenish bait and water. Decoy traps and other cage/live traps, as applied and used by WS, pose no danger to pets or the public and if a pet is accidentally captured in such traps, it can be released unharmed.

Mist nets are more commonly used for capturing small-sized birds such as house sparrows, finches, etc. but can be used to capture larger birds such as ducks and ring-neck pheasants or even smaller nuisance hawks and owls. It was introduced in to the United States in the 1950's from Asia and the Mediterranean where it was used to capture birds for the market (Day et al. 1980). The mist net is a fine black silk or nylon net usually 3 to 10 feet wide and 25 to 35 feet long. Net mesh size determines which birds can be caught and overlapping "pockets" in the net cause birds to entangle themselves when they fly into the net.

Cannon nets are normally used for larger birds such as pigeons, feral ducks, and waterfowl and use mortar projectiles to propel a net up and over birds which have been baited to a particular site. This type of net is especially effective for waterfowl that are flightless due to molting and other birds which are typically shy to other types of capture.

Swedish Goshawk traps are large cage type traps used for catching large birds of prey such as hawks and owls. These traps are two part traps with live bait (pigeons, rabbits, or starlings) placed in the lower section. The birds of prey are captured, when then investigate the prey and perch on the trigger bar causing them to fall into the upper portions of the trap, which closes around the bird.

Bal-chatri traps are small traps used for capturing birds of prey such as hawks and owls. Live bait such as pigeons, starlings, rodents, etc. are used to lure raptors into landing on the trap (Hygnstrom and Craven

1994) where nylon nooses entangle their feet and hold the bird. The trap is made of chicken wire or other wire mesh material which is formed into a Quonset hut-shaped cage that holds the live bait. The outside top and sides are covered with many nooses consisting of strong monofilament line or stiff nylon string.

Leghold traps are small traps that come in a variety of sizes that allows the traps to be species specific of some degree. These traps are used for both mammals and birds and can be set on land or in water. The traps are made of steel with springs to close the jaws of the trap around the foot and leg of the target species. These traps may have steel or padded jaws, which hold the animal.

Cage traps are live capture traps used to trap a variety of small to medium sized mammals. Cage traps come in a variety of sizes and are made of galvanized wire mesh, and consists of a treadle in the middle of the cage that triggers the door to close behind the animal being trapped.

Sherman box traps are small live traps used to capture small mammals such as rodents. These traps are often made of galvanized steel or aluminum and fold up for easy transport. Sherman box traps also consist of a treadle towards the back of the trap that triggers the door to close behind the animal being trapped.

Snares are traps made of light cable with a locking device, and are used to catch small and medium sized mammals. The cable is placed in the path of an animal in the form of a loop. When the target species walks into the snare the loop becomes smaller in size, holding the animal as if it were on a leash. Many snares are equipped with integrated stops that permit snaring, but do not choke the animal.

Bow nets are small circular net traps used for capturing birds and small mammals. The nets are hinged and spring loaded so that when the trap is set it resembles a half moon. The net is set over a food source and it triggered by an observer using a pull cord.

Hand nets are used to catch birds and small mammals in confined areas such as homes and businesses. These nets resemble fishing dip nets with the exception that they are larger and have long handles.

Net guns are devices used to trap birds and mammals. The devices project a net over at target using a specialized gun.

NONLETHAL METHODS - CHEMICAL

Egg oiling is method of suppressing reproduction of nuisance birds by spraying a small quantity of mineral oil or food grade corn oil on eggs in nests. The oil prevents exchange of gases and causes asphyxiation of developing embryos and has been found to be 96-100% effective in reducing hatchability. (Pochop 1998; Pochop et al. 1998). The method has an advantage over nest or egg destruction in that the incubating birds generally continue incubation and do not re-nest. The EPA has ruled that use of corn oil for this purpose is exempt from registration requirements under FIFRA. To be most effective, the oil should be applied anytime between the fifth day after the laying of the last egg in a nest and at least five days before anticipated hatching. This method is extremely target specific and is less labor intensive than egg addling.

Methyl anthranilate (artificial grape flavoring used in foods and soft drinks for human consumption) could be used or recommended by WS as a bird repellent. Methyl anthranilate (MA) (artificial grape flavoring food additive) has been shown to be an effective repellent for many bird species, including waterfowl (Dolbeer et al. 1993). Methyl anthranilate (MA) is also under investigation as a potential bird taste repellent. MA may become available for use as a livestock feed additive (Mason et.al. 1984; 1989). It is registered for applications to turf or to

surface water areas used by unwanted birds. The material has been shown to be nontoxic to bees (LD_{50} > 25 micrograms/bee[i]), nontoxic to rats in an inhalation study (LC_{50} > 2.8 mg/L^{1}), and of relatively low toxicity to fish and other invertebrates. Methyl anthranilate is naturally occurring in concord grapes and in the blossoms of several species of flowers and is used as a food additive and perfume ingredient (Dolbeer et al. 1992; RJ Advantage, Inc. 1997). It has been listed as "Generally Recognized as Safe" (GRAS) by the U.S. Food and Drug Administration (Dolbeer et al. 1992).

Water surface and turf applications of MA are generally considered expensive. For example, the least intensive application rate required by label directions is 20 lbs. of product (8 lbs. active ingredient) per acre of surface water at a cost of about $64/lb. with retreating required every 3-4 weeks (RJ Advantage, Inc. 1997). An example of the level of expense involved is a golf course in Rio Rancho, NM where it was estimated that treating four watercourse areas would cost in excess of $25,000 per treatment for material alone. Cost of treating turf areas would be similar on a per acre basis. Also, MA completely degrades in about 3 days when applied to water (RJ Advantage, Inc. 1997) which indicates the repellent effect is short-lived.

Another potentially more cost effective method of MA application is by use of a fog-producing machine (Vogt 1997). The fog drifts over the area to be treated and is irritating to the birds while being non-irritating to any humans that might be exposed. Fogging applications must generally be repeated 3-5 times after the initial treatment before the birds abandon a treatment site (Dr. P. Vogt, RJ Advantage, Inc., pers. comm. 1997). Applied at a rate of about .25 lb./ acre of water surface, the cost is considerably less than when using the turf or water treatment methods.

MA is also being investigated as a livestock feed additive to reduce or prevent feed consumption by birds. Such chemicals undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by U.S. Environmental Protection Agency (EPA) or the Food and Drug Administration (FDA).

Particulate feed additives have been investigated for their bird-repellent characteristics. In pen trials, starlings rejected grain to which charcoal particles were adhered (L. Clark, National Wildlife Research Center, pers. comm. 1999). If further research finds this method to be effective and economical in field application, it might become available as a bird repellent on livestock feed. Charcoal feed additives have been explored for use in reducing methane production in livestock and should have no adverse effects on livestock, on meat or milk production, or on human consumers of meat or dairy products (L. Clark, NWRC, pers. comm. 1999).

Other chemical repellents. A number of other chemicals have shown bird repellent capabilities. Anthraquinone, a naturally occurring chemical found in many plant species and in some invertebrates as a natural predator defense mechanism, has shown effectiveness in protecting rice seed from red-winged blackbirds and boat-tailed grackles (Avery et al. 1997). It has also shown effectiveness as a foraging repellent against Canada goose grazing on turf and as a seed repellent against brown-headed cowbirds (Dolbeer et al. 1998). This chemical is not yet registered in the U.S. but may become available at some future date. Compounds extracted from common spices used in cooking and applied to perches in cage tests have been shown repellent characteristics against roosting starlings (Clark 1997). Napthalene (moth balls) was found to be ineffective in repelling starlings (Dolbeer et al. 1998).

Tactile repellents. A number of tactile repellent products are on the market, which reportedly deter birds from roosting on certain structural surfaces by presenting a tacky or sticky surface that the birds avoid. However,

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[3] An LD_{50} is the dosage in milligrams of material per kilogram of body weight, or, in this case in micrograms per individual bee, required to cause death in 50% of a test population of a species.

experimental data in support of this claim are sparse (Mason and Clark 1989). The repellancy of tactile products is generally short-lived because of dust, and they sometimes cause aesthetic problems and expensive clean-up costs by running down the sides of buildings in hot weather.

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Avitrol is a chemical frightening agent (repellent) that is effective in a single dose when mixed with untreated baits, normally in a 1:9 ratio. Avitrol, however, is not completely non-lethal because a small portion of the birds are generally killed (Johnson and Glahn 1994). Pre-baiting is usually necessary to achieve effective bait acceptance by the target species. This chemical is registered for use on pigeons, crows, gulls, blackbirds, starlings, and English sparrows in various situations. Avitrol treated bait is placed in an area where the targeted birds are feeding and usually a few birds will consume a treated bait and become affected by the chemical. The affected birds then broadcast distress vocalizations and display abnormal flying behavior, thereby frightening the remaining flock away.

Avitrol is a restricted use pesticide that can only be sold to certified applicators and is available in several bait formulations where only a small portion of the individual grains carry the chemical. It can be used during anytime of the year, but is used most often during winter and spring. Any granivorous bird associated with the target species could be affected by Avitrol. Avitrol is water soluble, but laboratory studies demonstrated that Avitrol is strongly absorbed onto soil colloids and has moderately low mobility. Bio-degradation is expected to be slow in soil and water, with a half-life ranging from three to 22 months. However, Avitrol may form covalent bonds with humic materials, which may serve to reduce its availability for intake by organisms from water, is non-accumulative in tissues and rapidly metabolized by many species (Schafer 1991).

Avitrol is acutely toxic to avian and mammalian species, however, blackbirds are more sensitive to the chemical and there is little evidence of chronic toxicity. Laboratory studies with predator and scavenger species have shown minimal potential for secondary poisoning, and during field use only magpies and crows appear to have been affected (Schafer 1991). However, a laboratory study by Schafer et al. (1974) showed that magpies exposed to two to 3.2 times the published Lethal Dose (LD_{50}) in contaminated prey for 20 days, were not adversely affected and three American kestrels that were fed contaminated blackbirds for seven to 45 days were not adversely affected. A formal Risk Assessment found no probable risk is expected for pets and the public, based on low concentrations and low hazards quotient value for non-target indicator species tested on this compound (USDA 1997, Appendix P).

Alpha-chloralose is a central nervous system depressant used as an immobilizing agent to capture and remove nuisance waterfowl and other birds. It is labor intensive and in some cases, may not be cost effective (Wright 1973, Feare et al. 1981), but is typically used in recreational and residential areas, such as swimming pools, shoreline residential areas, golf courses, or resorts. Alpha-chloralose is typically delivered as a well-contained bait in small quantities with minimal hazards to pets and humans; single bread or corn baits are fed directly to the target birds. WS personnel are present at the site of application during baiting to retrieve the immobilized birds. Unconsumed baits are removed from the site following each treatment. Alpha-chloralose was eliminated from more detailed analysis in USDA (1997) based on critical element screening, therefore, environmental fate properties of this compound were not rigorously assessed. However, the solubility and mobility are believed to be moderate and environmental persistence is believed to be low. Bio-accumulation in plants and animal tissue is believed to be low. Alpha-chloralose is used in other countries as an avian and mammalian toxicant. The compound is slowly metabolized, with recovery occurring a few hours after administration (Schafer 1991). The dose used for immobilization is designed to be about two to 30 times lower than the LD_{50}. Mammalian data indicate higher LD_{50} values than birds. Toxicity to aquatic organisms is unknown (Woronecki et al. 1990) but the compound is not generally soluble in water and therefore should remain unavailable to aquatic organisms. Factors supporting the determination of this low potential included the lack of exposure to pets, nontarget species and the

public, and the low toxicity of the active ingredient. Other supporting rationale for this determination included relatively low total annual use and a limited number of potential exposure pathways. The agent is currently approved for use by WS as an Investigative New Animal Drug by the FDA rather than a pesticide.

Ketamine (Ketamine HCl) is a dissociative anesthetic that is used to capture wildlife, primarily mammals, birds, and reptiles. It is used to eliminate pain, calms fear, and allay anxiety. Ketamine is possibly the most versatile drug for chemical capture, and it has a wide safety margin (Fowler and Miller 1999). When used alone, this drug may produce muscle tension, resulting in shaking, staring, increased body heat, and, on occasion, seizures. Usually, ketamine is combined with other drugs such as xylazine. The combination of such drugs is used to control an animal, maximize the reduction of stress and pain, and increase human and animal safety.

Telazol (tiletamine) is another anesthetic used in wildlife capture. It is 2.5 to 5 times more potent than ketamine; therefore, it generally works faster and lasts longer. Currently, tiletamine can only be purchased as Telazol, which is a mixture of two drugs: tiletamine and zolazepam (a tranquilizer). Muscle tension varies with species. Telezol produces extensive muscle tension in dogs, but produces a more relaxed anesthesia in coyotes, wolves, and bears. It is often the drug of choice for these wild species (Fowler and Miller 1999). This drug is sold in a powder form and must be reconstituted with sterile water before use. Once mixed with sterile water, the shelf life is four days at room temperature and 14 days if refrigerated.

Xylazine is a sedative (analgesic) that calms nervousness, irritability, and excitement, usually by depressing the central nervous system. Xylazine is commonly used with ketamine to produce a relaxed anesthesia. It can also be used alone to facilitate physical restraint. Because xylazine is not an anesthetic, sedated animals are usually responsive to stimuli. Therefore, personnel should be even more attentive to minimizing sight, sound, and touch. When using ketamine/xylazine combinations, xylazine will usually overcome the tension produced by ketamine, resulting in a relaxed, anesthetized animal (Fowler and Miller 1999). This reduces heat production from muscle tension, but can lead to lower body temperatures when working in cold conditions.

LETHAL METHODS - MECHANICAL

Conibear (Body Gripping) Traps are the steel framed traps used to capture and quickly kill aquatic mammals. These traps come in a variety of sizes and may be used on land or in the water depending on size and state and local laws. The traps are made of two steel square frames that are hinged on two sides and have one or two springs.

Shooting is more effective as a dispersal technique than as a way to reduce bird densities when large numbers of birds are present. Normally shooting is conducted with shotguns or air rifles. Shooting is a very individual specific method and is normally used to remove a single offending bird. However, at times, a few birds could be shot from a flock to make the remainder of the birds more wary and to help reinforce non-lethal methods. Shooting can be relatively expensive because of the staff hours sometimes required (USDA 1997). It is selective for target species and may be used in conjunction with the use of spotlights, decoys, and calling. Shooting with shotguns, air rifles, or rim and center fire firearms is sometimes used to manage bird and mammal damage problems when lethal methods are determined to be appropriate. The birds and animals are killed as quickly and humanely as possible. WS follows all firearm safety precautions when conducting WDM activities and all laws and regulations governing the lawful use of firearms are strictly complied with.

Firearm use is very sensitive and a public concern because of safety issues relating to the public and misuse. To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within 3 months of their appointment and a refresher course

every 3 years afterwards (WS Directive 2.615). WS employees who carry firearms as a condition of employment, are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

Sport Hunting is sometimes recommended by WS as a viable damage management method when the target species can be legally hunted, and activities can meet airport security and safety compliance. A valid hunting license and other licenses or permits may be required by the Indiana Department of Natural Resources (IDNR) and USFWS for certain species. This method provides sport and food for hunters and requires no cost to the landowner. Sport hunting is occasionally recommended if it can be conducted safely for pigeon damage management White-tailed deer, Canada geese, and other damage causing waterfowl.

Snap traps are used to remove small rodents and may be modified to remove individual woodpeckers, starlings, and other cavity use birds. The trap treadle is baited with peanut butter or other taste attractants and attached near the damage area. These traps pose no imminent danger to pets or the public.

Cervical Dislocation is sometimes used to euthanize small rodents and birds which are captured in live traps and when relocation is not a feasible option. The bird is stretched and the neck is hyper-extended and dorsally twisted to separate the first cervical vertebrae from the skull. The AVMA approves this technique as humane method of euthanasia and states that cervical dislocation when properly executed is a humane technique for euthanasia of small rodents, poultry and other small birds (Beaver et al 2001).. Cervical dislocation is a technique that may induce rapid unconsciousness, does not chemically contaminate tissue, and is rapidly accomplished (Beaver et al 2001).

LETHAL METHODS - CHEMICAL

All chemicals used by WS are registered as required by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (administered by the EPA and the Indiana Department of Natural Resources (IDNR) or by the FDA. WS personnel that use restricted-use chemical methods are certified as pesticide applicators by IDNR and are required to adhere to all certification requirements set forth in FIFRA and Indiana pesticide control laws and regulations. Chemicals are only used on private, public, or tribal property sites with authorization from the property owner/manager.

Sodium Pentobarbital is a barbiturate that rapidly depresses the central nervous system to the point of respiratory arrest. There are DEA restrictions on who can possess and administer this drug. Some states may have additional requirements for personnel training and particular sodium pentobarbital products available for use in wildlife. Certified WS personnel are authorized to use sodium pentobarbital and dilutions for euthanasia in accordance with DEA and state regulations.

CO_2 is sometimes used to euthanize birds which are captured in live traps and when relocation is not a feasible option. Live birds are placed in a container such as a plastic 5-gallon bucket or chamber and sealed shut. CO_2 gas is released into the bucket or chamber and birds quickly die after inhaling the gas. This method is approved as a euthanizing agent by the American Veterinary Medical Association. CO_2 gas is a byproduct of animal respiration, is common in the atmosphere, and is required by plants for photosynthesis. It is used to carbonate beverages for human consumption and is also the gas released by dry ice. The use of CO_2 by WS for euthanasia purposes is exceedingly minor and inconsequential to the amounts used for other purposes by society.

DRC-1339 is the principal chemical method that would be used for starling/blackbird and pigeon damage management in the proposed action. For more than 30 years, DRC-1339 has proven to be an effective method of

starling, blackbird, gull, and pigeon control at feedlots, dairies, airports, and in urban areas (West et al. 1967, Besser et al. 1967, Decino et al. 1966). Studies continue to document the effectiveness of DRC-1339 in resolving blackbird starling problems at feedlots (West and Besser 1976, Glahn 1982, Glahn et al. 1987), and Blanton et al. (1992) reports that DRC-1339 appears to be a very effective, selective, and safe means of urban pigeon population reduction. Glahn and Wilson (1992) noted that baiting with DRC-1339 is a cost-effective method of reducing damage by blackbirds to sprouting rice.

DRC-1339 is a slow acting avicide that is registered with the EPA for reducing damage from several species of birds, including blackbirds, starlings, pigeons, crows, ravens, magpies, and gulls. DRC-1339 was developed as an avicide because of its differential toxicity to mammals. DRC-1339 is highly toxic to sensitive species but only slightly toxic to nonsensitive birds, predatory birds, and mammals. For example, starlings, a highly sensitive species, require a dose of only 0.3 mg/bird to cause death (Royall et al. 1967). Most bird species that are responsible for damage, including starlings, blackbirds, pigeons, crows, magpies, and ravens are highly sensitive to DRC-1339. Many other bird species such as raptors, sparrows, and eagles are classified as nonsensitive. Numerous studies show that DRC-1339 poses minimal risk of primary poisoning to nontarget and T&E species (USDA 1997). Secondary poisoning has not been observed with DRC-1339 treated baits. During research studies, carcasses of birds which died from DRC-1339 were fed to raptors and scavenger mammals for 30 to 200 days with no symptoms of secondary poisoning observed (Cunningham et al. 1981). This can be attributed to relatively low toxicity to species that might scavenge on blackbirds and starlings killed by DRC-1339 and its tendency to be almost completely metabolized in the target birds which leaves little residue to be ingested by scavengers. Secondary hazards of DRC-1339 are almost nonexistent. DRC-1339 acts in a humane manner producing a quiet and apparently painless death.

DRC-1339 is unstable in the environment and degrades rapidly when exposed to sunlight, heat, or ultra violet radiation. DRC-1339 is highly soluble in water but does not hydrolyze and degradation occurs rapidly in water. DRC-1339 tightly binds to soil and has low mobility. The half life is about 25 hours, which means it is nearly 100% broken down within a week, and identified metabolites (i.e., degradation chemicals) have low toxicity. Aquatic and invertebrate toxicity is low (USDA 1997). Appendix P of USDA (1997) contains a thorough risk assessment of DRC-1339 and the reader is referred to that source for a more complete discussion. That assessment concluded that no adverse effects are expected from use of DRC-1339.

DRC-1339 has several EPA Registration Labels (56228-10, 56228-17, 56228-28, 56228-29, and 56228-30) depending on the application or species involved in the BDM project.

Zinc Phosphide, at concentrations of 0.75% to 2.0% on grain, fruit, or vegetable baits, has been used successfully against such species as meadow mice, ground squirrels, prairie dogs, Norway rats, Polynesian rats, cotton rats and nutria. Zinc phosphide is a heavy, finely ground gray-black powder that is partially insoluble in water and alcohol. When exposed to moisture, it decomposes slowly and releases phosphine gas (PH3) Phospine, which s highly flammable, may be generated rapidly if the material comes in contact with dilute acids. Zinc phosphide concentrate is a stable material when kept dry and hermetically sealed.

Although zinc phosphate baits have a strong, pungent, phosphorous-like odor (garlic like), this characteristic seems to attract rodents, particularly rats, and apparently makes the bait unattractive to some other animals. For many uses of zinc phosphate formulated on grain or grain-based baits, pre-baiting is recommended or necessary for achieving good bait acceptance.

When zinc phosphate comes into contact with dilute acids in the stomach, phosphate (PH3) is released. It is this substance that probably caused death. Animals that ingest lethal amounts of bait usually succumb overnight with

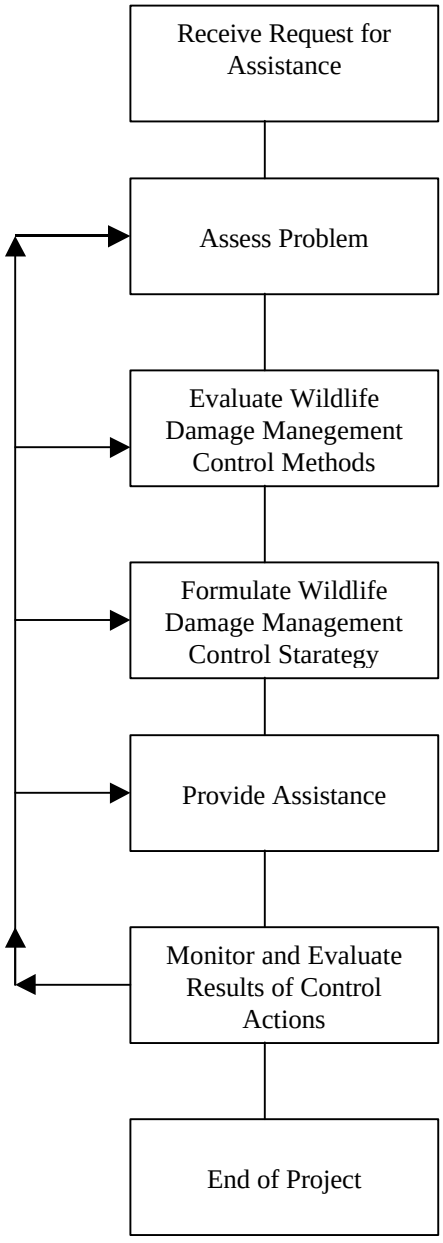
terminal symptoms of convulsions, paralysis, coma, and death from asphyxia. If death is prolonged for several days, intoxication that occurs is similar to intoxication with yellow phosphorous, in which the liver is heavily damaged. Prolonged exposure to phosphine can produce chronic phosphorous poisoning.

Because zinc phosphide is not stored in muscle or other tissues of poisoned animals, there is no secondary poisoning with this rodenticide. The bait however, remains toxic up to several days in the gut of the dead rodent. Other animals can be poisoned if they eat enough of the gut content of rodents recently killed with zinc phosphide.

Warfarin and Diphacinone. Several anticoagulant rodenticides are used to control commensal rodents and some field rodents around building and other structures. Common anticoagulants include warfarin and diphacinone. Anticoagulants are normally classified s multiple-dose toxicants. For the materials to be effective, animals must feed on the bait more than once. However, some newer formulations only require a single feeding to e effective. Bair for rats and mice must be continuously available for 2 to 3 weeks for efffective population control.

Appendix C

Wildlife Services Decision Model



Appendix D

List of Consulting People, Reviewers and Preparers

Michael P. Elsea, USDA-APHIS-WS, Wildlife Biologist
Judy S. Loven, USDA-APHIS-WS, Indiana State Director
David Reinhold, USDA-APHIS-WS, Eastern Region NEPA Coordinator
Ed Cleary, U.S. Department of Transportation, FAA
Roger Kult, Indiana Department of Natural Resources, District Biologist
Melody Miller, Indiana Department of Natural Resources, Waterfowl Biologist
Zack Walker, Indiana Department of Natural Resources, Deer Research Biologist
Keith Berlen, BAA Indianapolis International Airport, Operations Manager
Scott Pruitt, U.S. Fish and Wildlife Service, Bloomington, IN
Ron Weiss, National Audobon Society, Indianapolis, IN

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[1] The cost of management may sometimes be secondary because of overriding environmental, legal, human health and safety, animal welfare, or other concerns

[2] Generally involves modifications to the management of protected resources to reduce their vulnerability to wildlife damage

[3] An LD_{50} is the dosage in milligrams of material per liter of air required to cause death in 50% of a test population of a species through inhalation.